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Editor's Note

A key ingredient for a sound and efficient financial system is an adequately capitalised banking system. Capital provides a bank with a buffer against unexpected losses and also serves as a basis for its medium-term growth. But how much capital should banks hold?

In 1988, the Basel Committee on Banking Supervision – a committee established by the central bank governors of the G10 countries – developed the Basel Capital Accord, now widely known as Basel I. Basel I defined capital for the purposes of bank capital adequacy, and proposed a minimum capital requirement for banks of 8 per cent of total assets – assets being measured in such a way as to account for their relative risk. The Basel I framework has been widely followed in many countries, including New Zealand.

Over time, as financial markets and instruments have evolved and become more complex, banks and other institutions have adopted more sophisticated methods to measure and manage risk. In response, last year the Basel Committee released a new capital adequacy framework known as Basel II. In the first article of this issue, Andrew Yeh, James Twaddle, and Mike Frith of the Bank's Financial Stability Department provide an introduction to the Basel II framework and outline the Reserve Bank's plans to adopt the framework here in New Zealand.

The foreign exchange market plays a crucial role in the functioning of the New Zealand economy, enabling international trade flows as well as a channel to foreign capital markets. In our second article, Nick Smyth from the Financial Stability Department examines recent trends in foreign exchange market turnover, drawing on information from a three-yearly survey published by the Bank of International Settlements. Nick finds that trading of the New Zealand dollar has increased significantly over the past few years, and by more than many other currencies. Of note, is the extent to which trading of the New Zealand dollar now occurs offshore rather than in the domestic market.

The third article, by David Drage of the Financial Stability Department and Anella Munro and Cath Sleeman from the Economics Department, provides an update on the market for offshore issues of New Zealand dollar denominated bonds, commonly known as Eurokiwis and Uridashis. Issuance of these bonds has been very strong over the past two years, with domestic interest rates high relative to the rest of the world. The article explains the incentives to issue and purchase these bonds, and the role that these bonds play in enabling New Zealand to access the foreign capital market.

In our final article, Mike Wolyncewicz of the Bank's Financial Services Group discusses the rationale underpinning the five-yearly funding agreements for the financing of the Reserve Bank's operating expenditures. The article looks at the processes by which these agreements are reached and the accountability measures in place to monitor the use of resources. The article looks at the funding agreement that has been put in place for 2005-2010 against the backdrop of previous Funding Agreements.

This issue also contains a recent speech by the Governor on the New Zealand payments system – the complex infrastructure in place to transfer money of all types around the economy in order to settle obligations. The speech emphasises that ensuring a sound and efficient payments system is an important part of the Bank's financial stability role.

As always, I trust that readers will find this issue of the *Bulletin* interesting and informative.

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Basel II: A new capital framework

Andrew Yeh, James Twaddle and Mike Frith, Financial Stability Department

This article provides an introduction to the new Basel II Capital Framework (Basel II) and the Reserve Bank's approach to its implementation in New Zealand. Bank capital plays an important role in absorbing unexpected losses. Regulators have an interest in the amount of capital held by banks and set some minimum capital adequacy requirements for banks. Basel II replaces the current regulatory requirements and provides a new framework for thinking about capital's role in banking and how capital requirements should be calculated. The main objectives of Basel II are to increase the sensitivity to risk of regulatory capital requirements, and to provide incentives for banks to enhance their risk-management systems and processes. The Reserve Bank is responsible for setting regulatory capital requirements for banks incorporated in New Zealand. For locally-incorporated banks that also have operations overseas, the Reserve Bank liaises closely with the relevant foreign supervisors to ensure a smooth and efficient implementation and operation of the rules in New Zealand.

1 An introduction to regulatory capital

The importance of capital

Capital serves as a buffer against a bank's unexpected losses and as a basis for its medium-term growth. An adequately capitalised banking system that is better able to absorb losses and provide credit to consumers and businesses throughout the business cycle is more likely to promote a sound and efficient financial system and growth in the economy. The challenge for banks and regulators is determining an appropriate amount of capital that should be held against unexpected losses.

Banks would hold capital regardless of any regulatory requirement to do so. Depositors and investors are more likely to lend funds to a bank when they are confident of the bank's ability to absorb unexpected losses, and when they can see that bank owners also have funds at stake in the successful operation of the bank. However, the amount of capital that a bank would hold in the absence of regulatory requirements might be different to the amount of capital that would be optimal for society.

Bank failures can have negative impacts over and above losses for the creditors and shareholders of banks. Banks have an important role in the economy. They are usually the major providers of financial intermediation services¹

¹ Financial intermediation refers to the distribution of credit from those who want to lend to those who want to borrow.

and they play a central role in transferring funds between parties through their position in payments systems. The failure of a major bank would have the immediate effect of reducing the availability of credit within the economy, would limit people's access to funds, could put other banks into difficulty, and could lead to a system-wide crisis. System-wide bank crises can have disastrous real and financial effects for an economy. As a result, regulators set minimum capital requirements that take account of the wider adverse externalities that could arise from the failure of a bank, that the bank itself may not take into account.

Basel I – an international standard for regulatory capital requirements

Prior to 1988, there was no uniform international regulatory standard for setting bank capital requirements. In 1988, the Basel Committee on Banking Supervision² developed the Basel Capital Accord (Basel I) to align the capital adequacy requirements applicable to internationally-active banks. Basel I introduced two key concepts.

First, it defined what banks could hold as capital, as well as designating capital as Tier 1 or Tier 2 according to its

² The Basel Committee on Banking Supervision was established by the central-bank governors of the Group of Ten countries at the end of 1974. The Committee does not possess any formal supranational supervisory authority, but encourages convergence towards common supervisory approaches and standards without attempting detailed harmonisation of member countries' supervisory techniques.

Table 1

Basel I regulatory capital calculations

Type of bank asset	90 day govt bill	Residential mortgage	Corporate loan
Asset value	\$100m	\$100m	\$100m
Basel I risk weight	0%	50%	100%
Risk-Weighted asset (asset value * risk weight)	\$0	\$50m	\$100m
Minimum regulatory capital charge (risk-weighted asset * 8%)	\$0	\$4m	\$8m

loss-absorbing or creditor-protecting characteristics. Tier 1 capital, such as common stock and retained earnings, has the highest ranking as it can absorb unexpected losses to a certain level without a significant disruption to trading. Tier 2 capital, such as subordinated debt,³ does not have loss-absorbing properties but provides some protection to depositors in the event of bank failure because it is the last layer of debt that would be repaid in a bank's insolvency.

The second key concept introduced in Basel I was that capital should be held by banks in relation to the risks that they face. The major risks faced by banks relate to the assets held on balance sheet. Thus, Basel I calculated banks' minimum capital requirements as a percentage of assets, which are adjusted for their riskiness. To adjust assets for their riskiness, risk weights are assigned to assets. Higher weights are assigned to riskier assets such as corporate loans, and lower weights are assigned to less risky assets, such as exposures to government. Banks sum the risk-adjusted assets to calculate a total risk-weighted asset amount.

Basel I then sets banks' minimum total capital requirement (tier 1 plus tier 2) to be at least 8 percent of total risk-weighted assets, at least half of which must be tier 1. Table 1, above, shows the Basel I capital requirements for three types of assets.

Basel I recognised that banks work actively to reduce the risks on their balance sheets by using risk mitigation instruments such as collateral and guarantees, and lowered banks' capital requirements where they held these instruments.

³ Subordinated debt is a loan (or security) that ranks below other loans with regard to claims on assets or earnings. In the case of default, creditors with subordinated debt wouldn't get paid out until after the senior debt holders (or depositors) were paid in full.

However, Basel I also recognised that banks are exposed to risks that are not represented on the balance sheet. As a result, it specified capital requirements for off-balance sheet risks such as from underwriting commitments.

Evolving financial markets and risk-management techniques

Basel I has been a successful and widely-implemented standard in banking regulation. However, financial market architecture, activities, and instruments have evolved dramatically over the past two decades. Many major international banks and financial institutions have, over time, developed and adopted more complex methods of managing and measuring risk widening the gap between the simple risk framework of Basel I and the actual practice of some banks.

In response, the Basel Committee, through five years of development and consultation, developed a new capital adequacy framework. In June 2004, the Basel Committee released the Basel II Capital Framework otherwise known as Basel II.

The next section provides an overview of Basel II and, in particular, discusses the mutually reinforcing 'pillars' that make up the Basel II framework.

2 The Basel II Capital Framework

Basel I introduced risk-based capital requirements for banks. Basel II builds significantly on Basel I by increasing the sensitivity of capital to key bank risks. In addition, Basel II recognises that banks can face a multitude of risks, ranging from the traditional risks associated with financial

intermediation, to the day-to-day risks of operating a business, to the risks associated with the ups and downs of the local and international economies. As a result, the new framework more explicitly associates capital requirements with the particular categories of material risks that banks face.

The new capital framework also recognises that large, usually internationally active banks have developed approaches to risk measurement and management based on statistical inference rather than judgement alone. A major development of Basel II is in allowing banks, under certain conditions, to use their own 'internal' models and techniques to measure the major risks that they face, the probability of loss, and the capital required to meet that loss.

In developing the new framework, the Basel Committee wanted to incorporate the many elements that help promote a sound and efficient financial system over and above the setting of minimum capital requirements. With this in mind, the Basel II framework incorporates three complementary 'pillars' that draw on the range of approaches to help ensure banks are adequately capitalised.

- Pillar 1 – *minimum capital requirements* – specifies how banks should determine the capital requirements they should meet for the major risks that they face. These risks include credit risk, traded market risk, securitisation risk, and operational risk.
- Pillar 2 – *supervisory review process* – recognises that banks are ultimately responsible for managing their risks. However, supervisors can play a role in assessing banks' risk management practices, and ensure that the negative externalities that can arise from the failure of a bank are minimised and managed.
- Pillar 3 – *market discipline* – recognises the role played by market participants in 'regulating' bank behaviour, and promotes market discipline through the use of disclosure requirements.

The following sections highlight the importance and interdependencies of the three pillars of Basel II.

Pillar 1: minimum capital requirements

Pillar 1 constitutes the most substantial part of Basel II. Its primary objectives are to increase the risk sensitivity of capital requirements and align them more closely to the core risks that banks face. These risks include:

- *credit risk*, which refers to the risk of loss arising from a borrower defaulting on their obligations;
- *operational risk*, which is the risk of loss resulting from inadequate or failed internal processes, people, and systems, or from external events;
- *traded market risk*, which refers to the risk of loss from holding financial instruments for trading purposes and arises due to movements in market prices, such as interest rates, exchange rates, and equity values; and
- *securitisation risk*, which refers to the risk of loss associated with buying or selling asset-backed securities.

In addressing each of these core risks, Basel II recognises that financial institutions differ significantly. As a result, Basel II moves away from the 'one-size-fits-all' approach in Basel I and provides banks with the opportunity to apply approaches that correspond to the different business and risk management practices that they employ. For each of the core risks that banks face, Basel II provides 'standardised' and 'internal model' approaches to determine minimum capital requirements. None of the approaches are viewed as necessarily superior or inferior for all institutions. However, a major objective of Basel II is to promote improvements in banks' risk management processes by encouraging banks to develop more sophisticated risk measurement systems and practices where it is cost effective for them to do so. Improvements in banks' risk management processes will, in some cases, lead to lower minimum capital requirements.

The following sections discuss the Basel II approaches to determining the capital required to meet the core risks faced by banks.

Credit risk

Credit risk is the major risk that most banks must manage during the normal course of lending and credit underwriting. Within Basel II, there are two approaches to credit risk measurement: the standardised approach and the internal-ratings based (IRB) approach.

Standardised approach

The standardised approach builds on the Basel I approach and is the default option for determining minimum capital requirements. The standardised approach retains the relative simplicity of Basel I while increasing the risk sensitivity of regulatory capital requirements.

As with Basel I, the value of a bank's on-and-off balance sheet assets are adjusted by risk weights that are applied according to the riskiness of the underlying assets. To increase the risk sensitivity of the capital requirement, credit ratings from eligible rating agencies (such as Fitch or Standard and Poors), are used to increase the number of risk weight categories applied to the underlying assets, relative to Basel I. In this way the standardised approach differentiates riskiness within asset classes as well as across different asset classes.

Table 2 compares the capital required under Basel II for a corporate loan with varying credit ratings with the capital required for the same loan under Basel I. As can be seen the standardised approach implies a range of capital requirements depending on the riskiness of the loan, as proxied by the credit rating. Higher rated loans have lower capital requirements under Basel II than lower rated loans. The Basel I approach treats all corporate loans the same regardless of rating.

Table 2

Basel I and Basel II standardised approach to measuring the credit risk of a corporate loan

	Basel II				Basel I	
Credit rating	AAA to AA-	A+ to A-	BBB+ to BB-	Below BB-	Unrated	All loans
Asset value	\$100m	\$100m	\$100m	\$100m	\$100m	\$100m
Risk weight	20%	50%	100%	150%	100%	100%
Risk weighted asset	\$20m	\$50m	\$100m	\$150m	\$100m	\$100m
Capital requirement	\$1.6m	\$4m	\$8m	\$12m	\$8m	\$8m

Erratum: Original cited \$6.25m in column 2 last line. Corrected in the online edition 21 February 2012 to figure shown.

The Basel II standardised approach also allows for additional methods of mitigating credit risks. It provides for improved methods of measuring the risks that are mitigated by collateral and allows netting of assets and liabilities in some cases. It also allows credit risks to be mitigated by instruments such as credit derivatives, the markets for which have evolved dramatically over the past 10 to 20 years, and are now commonly used by banks to reduce credit risk.

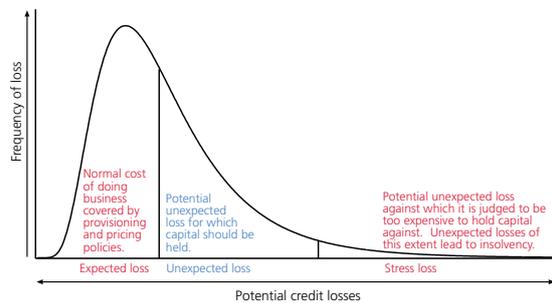
Internal-ratings based (IRB) approaches

The Internal Ratings Based (IRB) approaches represent the major development from Basel I in calculating minimum capital requirements. Over the past decade banks have invested heavily in economic capital models and systems that can better help them identify, measure, and manage the key risks that they face. The capability of modelling techniques has improved to the point that banks use them increasingly to determine internal capital targets, feed in to pricing strategies, assess risks, determine economic value added, and contribute to executive remuneration. The Basel Committee has recognised this development and looked to promote the development and use of these methods, where appropriate, by offering the IRB approaches to determine minimum capital requirements. Banks that apply the IRB approaches will base their minimum capital requirements on their own economic-capital models and systems.

Modelling the risk of loss

Figure 1, overleaf, provides a stylised version of how banks model the probability of loss in their portfolio of exposures. The area under the distribution represents the probability

Figure 1
Distribution of credit losses (for a given time horizon)



of loss for a given period and loss size. The distribution is negatively skewed as most credit losses tend to be small, with few very large losses. Two main types of loss are illustrated. Expected loss refers to the normal losses from doing business and is either taken into account in banks' pricing or met through specific provisions held on banks' balance sheets. Unexpected loss refers to the losses not covered by pricing or provisioning. These losses must be absorbed by capital to avoid insolvency and are therefore the losses considered by capital requirements.

It would be unreasonable and overly expensive for banks to hold enough capital to meet all unexpected loss events. Rather, banks hold enough capital to meet unexpected losses up to a given level. Unexpected losses over and above this level are referred to as stress losses and lead to bank insolvency. For Basel II regulatory purposes, banks are required to hold enough capital to meet unexpected losses with a probability of 0.999 over one year. Beyond this minimum required level, the amount of capital a bank will actually hold will depend on its internal risk appetite and market expectations.

Risk parameters help determine the shape and skewness of the density function depicted in figure 1. There are four key risk parameters in Basel II:

- **Probability of default (PD)** refers to the likelihood of a borrower defaulting on a contractual obligation.
- **Loss given default (LGD)** is the proportion of the obligation that the bank expects to lose, in the event of a default.

- **Exposure at default (EAD)** refers to the maximum amount of loss in the event of a default.
- **Maturity (M)** refers to the remaining age of the obligation.

As each parameter increases, the capital required to meet that loss increases.

To determine minimum capital requirements to meet credit risk, banks must categorise the asset side of their balance sheet into five major groups – sovereign, corporate, bank, retail, and equity. Banks apply an internal rating to every exposure within each of these groups, using an array of information such as historical information and borrower characteristics. Ratings are then grouped into 'buckets' and banks use historical default information to assign exposures within each rating bucket with forward-looking cyclically-adjusted estimates of the key risk parameters. Basel II recognises that there are some difficulties in forecasting future events and the influence they will have on a particular borrower's financial condition. As a result, banks must take conservative views of projected information and adopt a conservative bias where data limitations exist.

A bank applying the IRB approach feeds their forward-looking estimates of these risk parameters into the IRB equation (which include the 99.9% probability referred to above) to determine its pillar 1 minimum capital requirements.⁴ The IRB equation is based on the conditional probability of default of a single borrower with normally distributed asset returns. Based on figure 2, this is obviously not the ideal theoretical construct. However, it does reflect the realities of estimating capital requirements for regulatory purposes across many different banks.⁵ Any risks associated with the assumptions underlying the IRB equation are considered as part of the supervisory review process outlined in pillar 2.

⁴ **Basel II offers two IRB approaches. The foundation IRB approach requires banks to provide PD estimates only (the other risk parameters are provided by the framework), while the advanced IRB approach requires bank estimates of all the risk parameters.**

⁵ **See Thomas and Wang (2005) for a discussion on the theoretical and institutional background to the IRB equation.**

Validation and accreditation requirements

The Basel II framework recognises that banks using advanced credit risk measurement techniques apply a variety of internally-developed or ‘off-the-shelf’ models and processes to determine their key risk parameters. Consequently, given the potential for differences across banks and the importance of estimating adequate minimum capital requirements, banks wishing to implement the IRB approach must first apply to regulators for accreditation to do so. To be accredited to use the IRB approaches, banks’ internal risk measurement methodologies must meet a number of strict quantitative and qualitative requirements. These include:

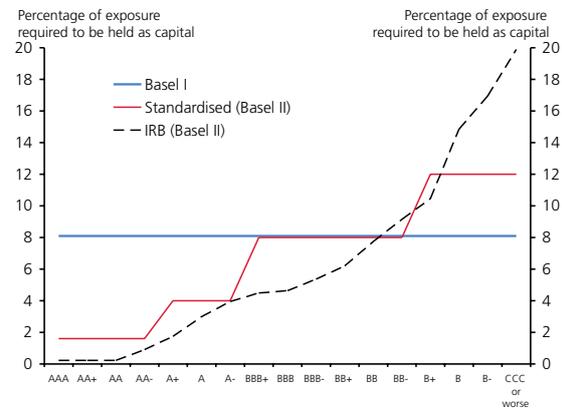
- an appropriately risk-sensitive internal rating system, which comprises the methods, processes, controls, data collection, and IT systems that support the assessment of credit risk and the quantification of default and loss estimates;
- facilities that capture borrower characteristics and sufficient default information to determine the estimates of the key risk parameters to within statistical confidence levels;
- appropriate corporate governance and internal controls;
- a modelling and capital estimation process that is embedded into the day -to-day operations of the bank; and
- a validation and testing procedure that ensures the bank is confident that their approach produces the appropriate PD, LGD, EAD and capital estimates to address their credit risks.

Increased risk sensitivity

The IRB approach further increases the risk sensitivity of the capital requirements compared to both Basel I and the standardised approach. Figure 2 illustrates the different capital requirements for the corporate loan examined in table 2 under Basel I and the two Basel II approaches. Under Basel I, the total capital charge is a uniform 8 per cent across all rating groups. Under Basel II, capital requirements reflect the riskiness of the loan. The IRB approach is the

Figure 2

Capital requirement for a corporate loan under Basel I and Basel II



most risk sensitive of the approaches and generates ‘smoother’ changes in the total capital requirement than the standardised approach.

Operational risk

Operational risk is the risk of loss resulting from inadequate internal processes, people, and systems, or from external events. A good example of an operational loss event could be the collapse of Barings Bank in 1995 as a result of internal control failures and massive speculative trading losses. Operational risk itself is not a new concept, and well-run organisations have been addressing it in their internal controls and corporate governance structures. However, applying an explicit regulatory capital charge against operational risk is a relatively new and evolving idea. Basel II requires banks to hold capital against the risk of unexpected loss that could arise from the failure of operational systems. As for credit risk, the framework provides simple and complex approaches to determine operational risk capital requirements.

The standardised approaches

There are a number of standardised approaches that calculate operational risk capital as a proportion of bank income (the basic indicator approach and the standardised approach), bank assets, or a combination of both (the alternative standardised approach). The rationale behind the simple approaches is that as a bank increases in size (represented by

balance sheet or income growth), operational risk increases and therefore operational risk capital should increase proportionately. The main advantage in applying these approaches to determine operational risk capital is their simplicity, and they are therefore targeted at banks applying the standardised approach to credit risk.

The advanced measurement approach

Similarly to the IRB approaches to credit risk, the advanced measurement approach (AMA) measures capital charges for operational risk based upon risk parameters from a bank's internal operational risk measurement system. Under this approach, minimum capital requirements depend on a bank's internal loss estimates. As with the internal model approaches to credit risk, banks must fulfil qualitative and quantitative requirements before they are eligible to use the AMA.

The Basel Committee and most regulators view that the estimation of operational risk capital using the AMA is still undergoing significant development. Indeed, a few regulators have not made the AMA available to banks operating within their jurisdiction, preferring to wait until there is evidence that statistical techniques will produce the appropriate loss estimates. In jurisdictions where the AMA is being made available to banks, it is typically being restricted to those banks applying the IRB approaches to credit risk.

Traded market risk

Traded market risk refers to the risk of loss from holding financial instruments for trading purposes, and arises due to movements in market prices, such as interest rates, exchange rates, and equity values. In 1996 the Basel Committee released the Market Risk Amendment, which expanded Basel I to set minimum capital requirements for the various market risks that banks face. The Market Risk Amendment

was in response to the increased trading activity by banks and the additional risk that this introduced.⁶

Basel II does not depart substantially from the Market Risk Amendment. Banks can use a standardised approach, which applies risk weights to open positions, or their own internal models⁷ to determine the minimum capital requirement. The main focus of Basel II is on ensuring that open positions in banks' trading books can be valued appropriately. In particular, financial products should be marked to market or, where necessary, to demonstrably prudent models.

Securitisation risk

Securitisation is a process whereby a pool of similar loans (eg, residential mortgages) or other financial assets is packaged and sold in the form of marketable securities. Securitisation risk may arise from any of the following sources:

- the risk from holding a security where the return is related to credit risk of the underlying assets that back the security;
- any residual credit risk that is not transferred off the originating bank's balance sheet, or that could be reinstated as a result of insufficient legal protection from the default of the underlying assets.

Treatment of securitisation exposures

As with the other pillar 1 risks, Basel II provides two broad approaches to measuring securitisation exposures: the standardised and ratings based approaches.

Banks that apply the standardised approach to measuring credit risk must also apply the standardised approach to measuring securitisation risk. The approach is similar to the standardised approach, whereby the minimum capital requirement is determined by risk weights that are applied to the held securities depending on the credit rating of the securitisation issue.

⁶ The Reserve Bank does not currently require capital to be held against traded market risk. Rather, banks must disclose information about their market risk exposures in their quarterly disclosure statements.

⁷ Under the internal models approach, 'value-at-risk' must be computed on a daily basis using a 99th percentile, one-tailed confidence interval. In calculating value-at-risk, an instantaneous price shock equivalent to a 10 day movement in prices is used.

Under the internal-ratings based approach, banks use a similar but slightly more complex approach than the standardised approach for securities that have external or inferred ratings. Where these ratings are not available, banks can use their own internal assessments of the credit quality of the underlying exposures. Only banks that have received supervisory approval to use the IRB approach to credit risk can apply the internal models based approach to determine the credit risk associated with the exposure to a security.

Recognising risk transference

Basel II specifies a number of conditions that a bank must meet before it can transfer credit risk from its balance sheet as a result of selling securities. These include evidence of the transference of significant credit risk to third parties, and that the bank does not maintain effective or indirect control over the transferred exposures.

Pillar 2: Supervisory review process

Whereas pillar 1 of Basel II addresses the core risks (credit, operational, traded market, and securitisation) that a bank faces, the main intention of the supervisory review process is to ensure that banks have adequate capital to support all of the material risks in their business.

Pillar 2 recognises that bank management is ultimately responsible for the business decisions that they make, and for ensuring that the bank is adequately capitalised to support its risks beyond the core minimum requirements covered in pillar 1. Consequently, the first stage of pillar 2 is for banks to develop a process that sets internal capital targets that are commensurate with their entire risk profile (including those identified as pillar 1 risks) and their control environment.

Pillar 2 also recognises that supervisors monitor individual bank capital adequacy because of the wider implications of a bank failure. As a result, supervisors may want to evaluate how banks assess their capital needs relative to their risks, and to intervene where appropriate. This interaction is intended to foster an active dialogue between banks and

supervisors such that when deficiencies are identified, banks take prompt and decisive action to reduce risk or restore capital.

Basel II sets out four guiding principles that provide the framework for the supervisory review process:

- i. Banks must have a process for assessing their overall capital adequacy in relation to their risk profile and a strategy for maintaining their capital levels.
- ii. Supervisors should review and evaluate banks' internal risk assessments and strategies and should take appropriate action if the results of this process are not satisfactory.
- iii. Supervisors should expect banks to operate above the minimum regulatory capital ratios
- iv. Supervisors should seek to intervene at an early stage to prevent capital from falling below the minimum levels required to support the bank's risk characteristics.

Implicit in the first principle is that all material risks faced by a bank should be addressed by the bank. The supervisor acts when capital is clearly below the minimum levels required to support all of the material risk characteristics of the bank. Three material risk characteristics that supervisors will pay particular attention, and that will be particularly suited to treatment under pillar 2 are considered below.

Risks considered under pillar 1 that are not fully captured by the pillar 1 process

There are likely to be residual pillar 1 risks resulting from the measurement methods used by banks. A good example is credit-concentration risk, which refers to the risk of loss due to the exposures in a portfolio being closely related or positively correlated. There are two main risks associated with credit concentration. The first is that borrowers in a concentrated portfolio tend to survive and fall together resulting in PDs and LGDs that cannot be considered independently. The second risk is that a portfolio with similar types of assets may not possess the characteristics for modelling techniques to work adequately.

Supervisors will also be interested in the approach taken by banks to meet model risks – those risks due to the underlying assumptions made by banks’ own models as well as the underlying assumptions made in the construct of the IRB equation. Supervisors would expect banks to take a conservative approach to capital calculations where there were concerns about the robustness of model assumptions.

Bank risks that are not taken into account by the pillar 1 process

Whereas interest rate risk in the trading book is considered under pillar 1, in many cases interest rate risk in the banking book (IRRBB) is just as important. IRRBB is included within the supervisory review process as the Basel Committee believes that the variation of methods used by banks to model IRRBB makes it too difficult to include alongside other pillar 1 risks. However, Basel II does provide guidance to banks and supervisors that relate to the ability of bank models to include all material interest rate positions and to consider all relevant repricing and maturity data.

Risk factors that are external to the bank

The business cycle can have a number of effects on banks’ capital requirements. Firstly, Basel II requires banks’ estimates of the key risk factors to reflect the ability of borrowers to perform over an entire business cycle and not just the current or most recent economic period. Where risk factors are derived from historical information that does not contain at least one full cycle, minimum capital requirements will need to be adjusted accordingly.

Similarly, banks should take into account the likelihood that recovery values for liquidated assets during an economic downturn are likely to be lower than normal and lead to higher or ‘stressed’ LGDs. Including a stressed LGD analysis through pillar 2 could potentially increase banks’ capital requirements.

The nature of the tail of the loss distribution shown in figure 1 could be considered under pillar 2. Supervisors are particularly interested in the types of events that could lead to unexpected losses over and above those covered by

capital and that result in bank failure. A useful method of doing this is to stress-test banks’ capital levels and the 0.999 confidence interval included in the IRB equation. The main goal of stress-testing is to investigate the ability of banks to absorb potential losses that may arise from a set of extreme but plausible shocks. Supervisors might require additional capital to be held if banks were not resilient to realistic macroeconomic stress events.

While the pillar 1 framework for determining capital requirements is relatively advanced, regulators are still working hard to develop the supervisory review process and in particular how pillar 2 capital requirements will be determined. Ongoing work in the areas identified above will shed more light as to how pillar 2 risks will be determined.

Pillar 3: Market discipline

Market participants have an interest in ensuring banks are adequately capitalised and through their actions can encourage the bank to behave prudently. This is often referred to as market discipline. In developing the Basel II framework, the Basel Committee decided to incorporate a greater role for market discipline by introducing capital adequacy-related public disclosure requirements for banks.

The objectives of market disciplines are reasonably straightforward. In a well-functioning market, financial institutions with poorly developed risk management structures tend to be penalised by the market through higher funding costs because the banks’ counterparties assess the institution as more risky, while those with prudent risk management structures tend to be rewarded.

A key component in promoting market discipline in this context is ensuring that bank customers, institutions, and other market participants have ready access to the appropriate information that allows them to monitor bank performance and risk-taking. Pillar 3 achieves this by requiring banks to disclose, on a timely basis, relevant quantitative and qualitative information relating to the nature of their risks, their risk measurement processes, and their capital adequacy.

Market discipline is one of the cornerstones of the Reserve Bank's approach to bank regulation, and disclosure is not a new concept for banks operating in New Zealand. For a number of years, banks that have a New Zealand presence have been required to make comprehensive quarterly financial and prudential disclosures to the market. As a result, the pillar 3 requirements sit well with the New Zealand regulatory approach.

3 The RBNZ's approach to Basel II

The Reserve Bank exercises its banking regulation powers for the purposes of promoting the soundness and efficiency of the New Zealand financial system and of avoiding significant damage to the financial system that could result from the failure of a bank. Specifying minimum capital requirements for locally-incorporated banks is a key regulatory tool used by the Reserve Bank to achieve these objectives and the Reserve Bank currently requires banks to meet most Basel I requirements.

The Reserve Bank will be updating its capital rules to take account of Basel II. However, as it is up to each regulator to determine how it will implement the guidelines provided by the Basel II framework and the Reserve Bank is still developing the details of how Basel II will be implemented in New Zealand, this section provides only a high-level discussion on implementation in New Zealand. A more detailed discussion will be provided in forthcoming articles.

Implementation intentions

The Reserve Bank will seek to implement Basel II in a way that promotes the basic principles of its capital adequacy regime. These principles include:

- that the level and quality of capital that banks must hold for times of stress should be conservative;
- that capital adequacy rules for all banks should be simple and uniform to the greatest extent possible; and
- that bank directors and senior management should face appropriate incentives to manage their bank's risks effectively.

Within these guiding principles, the Reserve Bank will make available all approaches under the Basel II Framework. However, the approaches based on banks' internal risk modelling (ie: IRB for credit risk and AMA for operational risk) will be available only to banks that meet certain minimum requirements.

Implementation timelines

The Reserve Bank will require locally-incorporated banks to apply its Basel II capital adequacy rules in New Zealand from January 2008. This timing is similar to the Basel Committee's recommendation for G10 countries, though a year later than the recommended implementation date for the standardised approaches. The common implementation date for all banks, including those applying the standardised approach, recognises the advantages of having a common implementation date for all banks and of allowing banks planning to use the standardised approaches extra time to prepare.

As Basel II will be implemented on a consolidated basis across international borders, this will mean that in some cases the timing of Basel II implementation by foreign-owned banks will be driven by the objectives of the parent bank or the home regulator. In these circumstances the Reserve Bank will consider, on a case-by-case basis, whether a later implementation date in New Zealand is appropriate.

Banks planning to use the internal models approaches will need to do a 'parallel run', where they will be required to produce Basel II capital calculations while continuing to meet their existing Basel I capital requirements. The parallel run provides the Reserve Bank and participating banks to get an indication of the overall effects that the internal models approaches will have for pillar 1 capital requirements. The Reserve Bank will require a one-year parallel run period starting from January 2007 for locally-incorporated banks applying for accreditation to use the internal model approaches in July 2006.

Coordination with foreign supervisors

As was the case under Basel I, under Basel II, group capital requirements for internationally-active banks are determined on a consolidated basis while capital requirements for locally-incorporated subsidiaries are determined on a legal entity basis. As the majority of banks in New Zealand are parts of banking groups with operations in a number of countries, the interaction of group and local bank capital adequacy rules will be particularly important. The successful implementation of Basel II in New Zealand will therefore require liaising with the relevant foreign supervisors to ensure the smooth implementation of Basel II for such banks.

In particular, the four largest banks in New Zealand – Westpac, ANZ National Bank, BNZ and ASB—are all owned by banks based in Australia, and the Australian banking group is supervised by the Australian Prudential Regulation Authority (APRA). As a result, the Reserve Bank and APRA intend to work closely throughout the Basel II implementation process. To facilitate, a Terms of Engagement between APRA and the Reserve Bank for coordinated implementation and ongoing banking supervision under Basel II has been developed. The Terms of Engagement outlines some high-level principles for the cross-border implementation of Basel II in Australia and New Zealand. In particular:

- the Terms of Engagement recognises APRA's rights as home supervisor for Australian banking groups to set minimum levels of capital on a consolidated basis for Australian banking groups with operations in several jurisdictions;
- the Terms of Engagement recognises the Reserve Bank's rights as host supervisor for foreign-owned banks incorporated in New Zealand to set minimum levels of capital for the New Zealand incorporated operations; and
- the Terms of Engagement optimises the use of supervisory resources and reduces compliance costs to the extent possible, subject to adequate supervisory review of capital adequacy at the consolidated and the subsidiary levels.

The ToE also includes a commitment to use each supervisor's comparative advantage and knowledge base when

undertaking supervisory reviews of banks operating in both jurisdictions, and aims to enhance the efficiency of supervision by APRA and the Reserve Bank by sharing information and assessments needed for the purposes of supervisory review.

4 Conclusions

Bank capital is a key contributing factor to a sound and efficient financial system and everyone has an interest in ensuring banks hold sufficient levels of capital.

The Basel II Capital Framework provides a new and improved way of thinking about risk measurement, management, and capital adequacy for banks. Its primary objectives are to utilise developments in risk measurement methods to improve the risk sensitivity of capital charges, and to better align banks' capital requirements with the risks that they face. To do this Basel II draws on mutually reinforcing pillars. These pillars include the mechanics of calculating minimum capital requirements for core bank risks (pillar 1), the roles banks and supervisors have in ensuring banks hold enough capital to meet material risks (pillar 2), and encouraging market discipline by specifying disclosure requirements (pillar 3).

The Reserve Bank is responsible for setting bank capital requirements and implementing Basel II in New Zealand. Implementation plans are well in train and future articles will shed more light on the Reserve Bank's approach to implementing Basel II in New Zealand.

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Recent trends in foreign exchange turnover

Nick Smyth, Financial Stability Department¹

We examine recent trends in the global foreign exchange market using the 2004 BIS triennial foreign exchange turnover survey. The survey shows trading in the New Zealand dollar has increased significantly over the past three years. This reflects increased offshore capital investment into New Zealand and the associated higher global profile of the New Zealand dollar. Foreign exchange trading in New Zealand has also increased, largely in line with global trends. The survey gives new insights into the global nature of the New Zealand dollar market.

1 Introduction

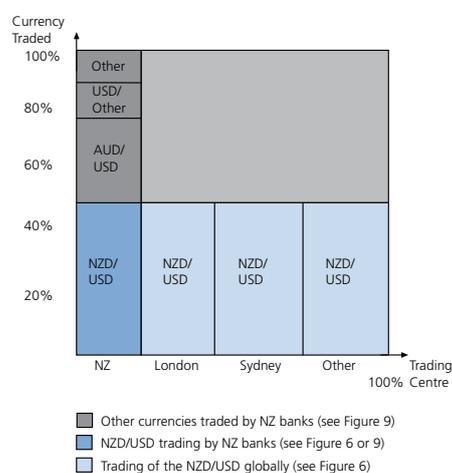
A well functioning foreign exchange (FX) market is important to the New Zealand economy. The FX market facilitates international trade flows and enables domestic banks to access capital in offshore markets, which lowers the costs of borrowing for New Zealand businesses and households.

The Reserve Bank is interested in ensuring the FX market continues to provide these services to New Zealanders. Should the New Zealand dollar market become disorderly, potentially disrupting important cross-border transactions, the Reserve Bank is charged with the role of restoring confidence in, and maintaining the functioning of, the market through the implementation of its FX intervention policy.²

Every three years the Bank for International Settlements (BIS) conducts a survey of central banks and monetary authorities that provides a comprehensive breakdown of global FX turnover.³ The survey gives us a formal opportunity to update our knowledge of the FX market. In March 2005, the BIS released the final results of its 2004 survey. This article summarises key findings of this survey, concentrating on trading in the New Zealand dollar and trading in the New Zealand market. Figure 1 shows how the New Zealand dollar and New Zealand FX markets relate.

Figure 1

A stylised representation of FX turnover in the New Zealand dollar market and the New Zealand market*



* Outside New Zealand, almost all NZD trading takes place against the USD.

2 Global foreign exchange market trends

Size of the market

The global FX market is large. Around USD 1,800 billion is traded in the global FX market on an average day (see box 1).⁴ The amount of FX trading dwarfs the needs of the end-users of the FX market, such as importers, exporters, and investors in physical capital (such as plant or machinery).

Most of the turnover in the FX market reflects international capital flows into other financial markets, for instance, money markets or bond markets.⁵ Investors in international

¹ The author would like to thank Ian Nield, Kelly Eckhold, Bruce White and Ofer de Mayo, for their assistance with this article.

² See "Foreign reserves for crisis management" by Michael Gordon, Reserve Bank of New Zealand *Bulletin*, Vol. 68, No. 1 for more on the Reserve Bank's intervention policy to calm disorderly markets.

³ The full results can be viewed on the internet, <http://www.bis.org/publ/rpfx05.htm>

⁴ Throughout this article, all the FX turnover figures we quote are net of double counting among reporting dealers.

⁵ Market participants estimate that FX trading related to international capital flows is around five to ten times that related to end-user flows.

capital markets tend to transact much more frequently, often many times a day. Another reason FX trading is high is because price-making dealers in the FX market trade with each other constantly to clear currency positions they don't want to hold.⁶

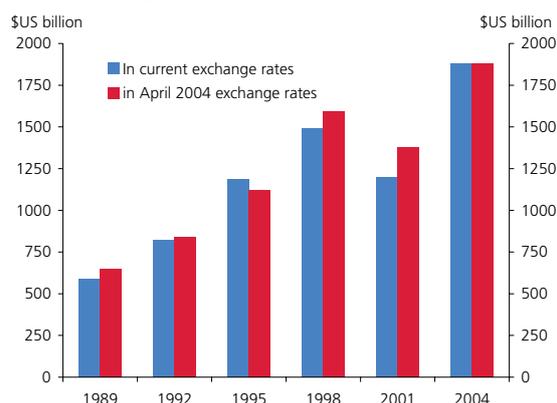
Recent trends

FX turnover has been trending higher since the BIS began its survey of the global FX market in 1989. There are two main reasons for this:

- The world economy and international trade continue to grow.
- The global financial markets continue to become more integrated.

Although FX turnover has been trending higher, the extent of the rise in turnover between 2001 and 2004 was unprecedented. Global FX turnover increased by over 50 per cent between 2001 and 2004, from an average daily turnover of USD 1,173 billion to USD 1,773 billion (see figure 2).⁷ This increase in turnover more than reversed the decline between the 1998 and 2001 surveys.

Figure 2
Global foreign exchange turnover



Note: Includes spot, outright forwards, FX swap transactions as well as estimated gaps in reporting

⁶ This interbank trading process is also referred to as “pass-the-parcel” trading. See Rosborough (2001) for a fuller description of how this process can multiply total FX turnover.

⁷ The figures referred to here are net of double counting, and include only transactions where at least one of the counterparties is located in the country of the currency traded.

Why did global FX turnover increase so much between 2001 and 2004?

The rise in turnover partly reflects base currency effects. The US dollar is the standard currency against which others are traded (see figure A in box 1). If we take account of the depreciation in the US dollar (and changes in the other remaining base currencies) between 2001 and 2004, FX turnover increased by 36 per cent.

The rise in turnover also reflects some ‘catch-up’ from unusually low levels in 2001. At that time, commentators pointed to growth in electronic broker systems, financial industry consolidation, and the introduction of the euro currency as reasons behind the decline in turnover in 2001.⁸ These special factors have been less important in the last few years.

Similarly, a number of disruptive events in financial markets in the late 1990s contributed to the decline in turnover in the 2001 survey. The Asian crisis, the collapse of Long-Term Capital Management, the Russian debt crisis, and the fall-out from the ‘dotcom’ equity bubble triggered a general decline in risk taking and a drift away from FX trading. Recent years have seen more stable market conditions, a greater appetite for risk among global investors, and the growth in FX trading as an ‘asset class’ in much the same way investors trade bond and equity markets.

The growth of hedge funds is an example of the growth in speculative investment.⁹ Hedge funds tend to trade more actively than many participants in the FX market. Hedge funds, and other similar investment funds like commodity trade advisers, have devoted a greater proportion of their funds to speculating on currencies, leading to growth in FX markets.

In an environment where global bond yields were at historically low levels and major sharemarkets were performing modestly, investors paid more attention to alternative investment strategies in the search for higher returns. Between 2001 and 2004, trading currencies

⁸ See Rosborough (2001) for a more complete description of these factors and why they affected foreign exchange turnover.

⁹ See ‘Why has FX trading surged?’, *BIS Quarterly Review* (2004)

Box 1

A brief snapshot of the global foreign exchange market

The BIS survey shows that USD 1,773 billion is traded on average each day in the global FX market. The USD is still by far the most frequently traded currency – the US dollar is on one side of nearly 90 per cent of all FX transactions (see Table 1). The euro is the next most traded currency, accounting for 37 per cent of all transactions. The New Zealand dollar is the eleventh most traded currency.

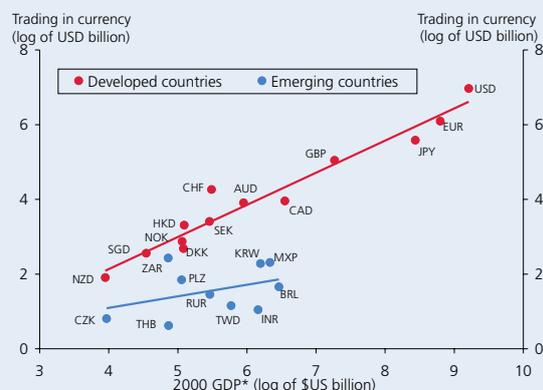
The currencies of larger developed economies naturally are more heavily traded than those of smaller developed economies. Turnover in the New Zealand dollar is around what we might expect based on the size of the New Zealand economy and its trade.

A similar relationship between economic size and currency turnover is now apparent for emerging markets. In fact, figure 3 shows that the linear relationship between turnover and GDP in emerging markets is now quite

Figure 3

Currency turnover versus nominal GDP

2001 survey



2004 survey

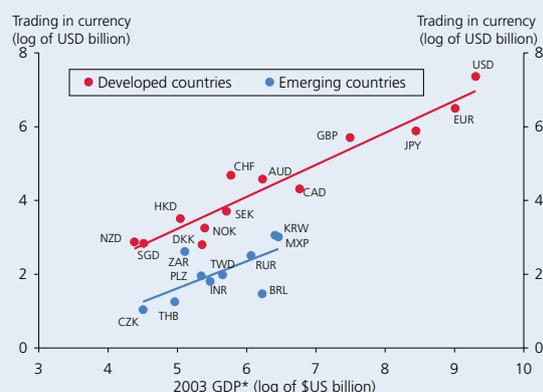


Table 1

Currencies and currency pairs traded in 2004

Currency	USD billion	As a % of total	Currency pair	USD billion	As a % of total
US dollar	1,573	88.7	EUR/USD	501	28.2
Euro	659	37.2	USD/JPY	296	16.7
Yen	359	20.3	USD/Other	293	16.5
Pound sterling	299	16.9	GBP/USD	245	13.8
Swiss franc	108	6.1	AUD/USD	90	5.1
Australian dollar	97	5.5	USD/CHF	78	4.4
Canadian dollar	75	4.2	USD/CAD	71	4.0
Swedish krona	41	2.3	EUR/JPY	51	2.9
Hong Kong dollar	33	1.9	GBP/EUR	43	2.4
Norwegian krone	26	1.5	EUR/CHF	26	1.5
Won	21	1.2	EUR/Other	26	1.4
Mexican peso	20	1.1			
New Zealand dollar	18	1.0			
TOTAL	1,773	200.0	TOTAL	1,773	100.0

Note 1: All turnover is net of double counting

Note 2: For currencies traded, total percentage adds to 200% because there are always two currencies in each FX transaction

Table 2

Trading centres

2004 Ranking	2001 Ranking	Country	USD billions	As a % of total
1	1	United Kingdom	753	31.3
2	2	United States	461	19.2
3	3	Japan	199	8.3
4	4	Singapore	125	5.2
5	5	Germany	118	4.9
6	7	Hong Kong SAR	102	4.2
7	8	Australia	81	3.4
8	6	Switzerland	79	3.3
:	:	:		
26	29	New Zealand	7	0.3

similar to the relationship in developed countries. This indicates that the FX markets of larger emerging market economies are becoming deeper and more similar to those of more advanced economies.

London remains the dominant world FX trading centre – nearly a third of all trading takes place in the UK (see table 2). New York and Tokyo, the major trading centres in the

American and Far-East time-zones respectively, account for another quarter of global turnover.

Table 3 shows that slightly more than half of all transactions are FX swaps and just over a third are spot transactions.

Table 3

Foreign exchange instruments

	1995		1998		2001		2004	
	USD billion	%						
Spot	494	43	568	40	387	33	621	35
Outright forwards	97	9	128	9	131	11	208	12
FX swaps	546	48	734	51	656	56	944	53
TOTAL	1,137	100	1,430	100	1,174	100	1,773	100

Box 2

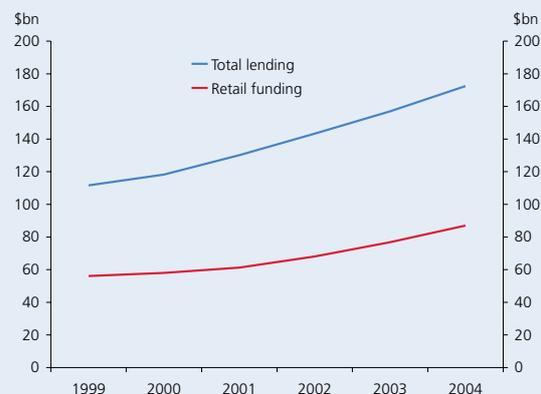
Bank funding and foreign exchange swaps

Banks in New Zealand make significant use of overseas borrowings to fund their balance sheets (see *Financial Stability Report*, May 2005). Typically about a third of a New Zealand banks' funding is sourced offshore from the issuance of either commercial paper or medium-term note issues in the major financial centres, or a bank's parent. In March 2001, total funding among the major banks was about \$160bn and this rose to \$196bn in March 2004. The offshore sourced funds were approximately \$53bn and \$65bn respectively.

To eliminate the risk to the banks of exchange rate fluctuations these borrowings are converted to New Zealand dollars as foreign exchange swaps, rather than outright purchases of the domestic currency.

The banks have a number of natural counterparties for such transactions, including, but not restricted to New Zealand fund management organisations; the New Zealand government; and offshore issuers of NZD denominated debt (eg, 'Uridashi' and 'Eurokiwi' issues).

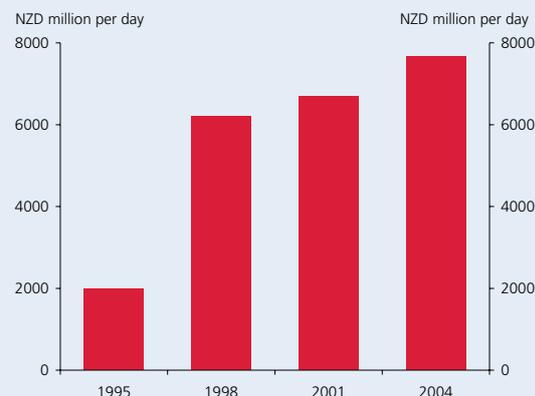
Figure 4
Funding 'gap' for systemically important New Zealand banks (following May FSR)



The total volume of all FX swaps transacted in the New Zealand market in April 2004 was about \$7.7bn per day, of which \$4.9bn was NZD swaps. This was an increase of about \$1bn per day over the 2001 survey.

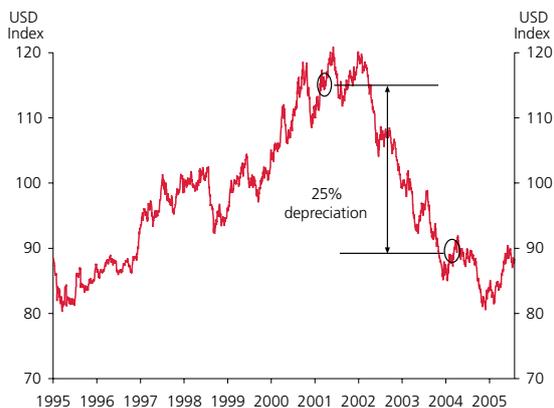
Bank funding was an important contributor to this rise. Based upon estimates of the median term of bank funding (80 days) and the amount of offshore funding (\$65bn), it is likely that about \$820m of the \$4.9bn transacted, on average, each day in April 2004 was due to banks swapping the proceeds of foreign borrowings into New Zealand dollars. Similar estimates for April 2001 indicate that the turnover was about \$670m per day – indicating that bank funding contributed some \$150m per day to the overall rise of \$1bn in swaps business in the New Zealand market.

Figure 5
Daily NZD FX swaps turnover



grew in popularity as an investment strategy because the US dollar exhibited a clear and persistent downward trend (see figure 6) whereas bonds and equities tended to move within established ranges.

Figure 6
US dollar index

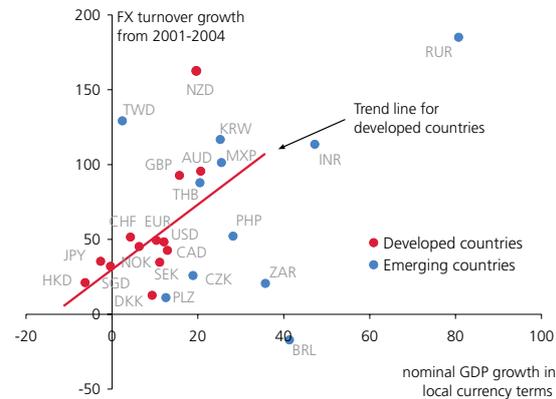


Many speculative investors sold the US dollar with a view that this trend would continue. Some investors believed the US dollar would depreciate to encourage financing of the US current account deficit. Meanwhile, trend-following and momentum investors were willing simply to sell the US dollar until the trend finished. This trade was particularly attractive because US interest rates fell to historically low levels, which made it relatively inexpensive for investors to sell the US dollar in order to purchase higher-yielding currencies.¹⁰

Speculative investors favoured selling the US dollar and investing in high-yielding currencies (the New Zealand and Australian dollars and the British pound) and some emerging market currencies – so called ‘carry trades’. Robust economic growth, higher interest rates, and rising asset prices in these regions made them attractive investment destinations (figure 7 shows turnover in high-yielding and emerging market currencies grew rapidly between 2001 and 2004).

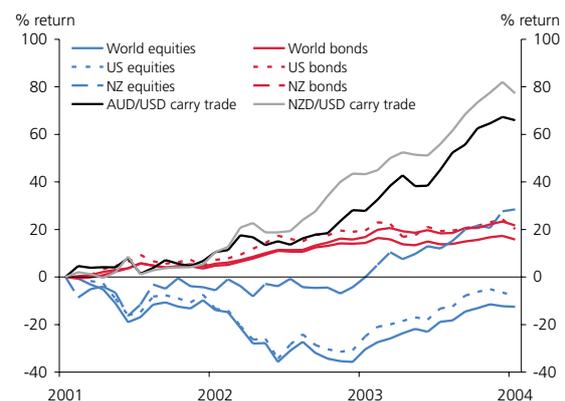
¹⁰ There is either an explicit or an opportunity cost to selling a currency. This is equal to the interest rate on the currency being sold.

Figure 7
Economic growth versus FX turnover growth



The New Zealand dollar was reportedly one of the most popular investment destinations for the carry trade. Between 2001 and 2004, investors profited from the difference between the New Zealand and US interest rates – referred to as the ‘carry’ – and the extended appreciation of the NZD/USD. Figure 8 shows the relatively high return to the NZD/USD and AUD/USD carry trades compared to world bond and equity markets over this time.¹¹

Figure 8
Relative returns from equity markets, bond markets, and carry trades¹²



¹¹ The carry trade does not always produce such high returns. Between 1998 and 2001 the NZD/USD carry trade would have produced negative returns.

¹² The carry trade return is calculated as the product of the cumulative return in the overnight interest rate differential and the cumulative return from spot exchange rate changes. Returns are in local currency terms.

3 Global trends in New Zealand dollar turnover

Global daily turnover in the New Zealand dollar (foreign exchange swaps, spot and forwards) in 2004 was around USD 25 billion.¹³ Of this, most trading took place in London, while around 17 per cent took place within New Zealand (see table 4). New Zealand is not unusual in that its currency is largely traded in offshore markets. For example, only 18 per cent of Swiss franc trading takes place in Switzerland while 30 per cent of Australian dollar trading takes place in Australia.¹⁴ Although most New Zealand dollar trading takes place outside New Zealand, a substantial proportion takes place in other centres in our time-zone (particularly Australia).

According to the BIS, New Zealand dollar turnover increased 150 per cent between 2001 and 2004. However, the

true growth in New Zealand dollar turnover is probably lower than this figure because several trading centres did not report New Zealand dollar trading in the 2001 survey. Some of the increase in New Zealand dollar turnover can be explained by base currency effects (ie, changes in the value of the NZD/USD).

Foreign exchange swap activity

Foreign exchange swaps (FX swaps) are the most traded New Zealand dollar instrument (see Box 3). Average daily turnover in FX swaps is around USD 17 billion, or 70 per cent of total FX transactions (see table 5).

FX swap turnover increased significantly between 2001 and 2004. To some extent, the increase in FX swap turnover can be attributed to domestic banks increasing the amount of funds they raise offshore, which are then converted to

Table 4
Foreign exchange trading of New Zealand and Australian dollars

Trading centre	New Zealand dollar		Australian dollar	
	Total - in USD	as a % of total	Total - in USD	as a % of total
London	6,841	28	28,924	22
Australia	5,320	21	39,397	29
New Zealand	4,202	17	1,889	1
Asia	3,551	14	31,354	23
New York	3,298	13	20,855	16
Other	1,556	6	11,880	9
TOTAL	24,767	100	134,300	100

Source: BIS (confidential report obtained by request)

Table 5
Breakdown of NZ dollar turnover by transaction type

Transaction type	2004		2001	
	Total - in USD	as a % of total	Total - in USD	as a % of total
Spot	5,534	22	1,635	15
Outright forward	1,755	7	846	8
FX swaps	17,478	71	8,169	77
Total	24,767	100	10,650	100

Note: 2001 figures exclude New Zealand dollar trading in some trading centres

¹³ Total turnover in this section differs from other parts of the article because it involves all FX transactions involving the NZD, irrespective of where in the world they occurred. In the published BIS statistics, the BIS only counts trades when at least one party is connected to the country of the currency traded. This data was obtained by request from the BIS.

¹⁴ The Reserve bank of Australia estimates that about 40 per cent of turnover in Australian dollars occurs in the Australian market ('The Australian Foreign Exchange and Derivatives Market', Reserve Bank of Australia Bulletin, June 2005, p. 6). This is because of the difference in netting methodology in calculating domestic turnover between the BIS and RBA. The RBA adjusts for cross-border double counting in the global data, but does not adjust the local data whereas the BIS adjusts both cross-border and local data for double counting. The RBNZ follows the BIS methodology.

New Zealand dollars (by using FX swaps for on-lending to New Zealand borrowers).

In box 2 we estimate the likely extent of this increase in foreign borrowing by local banks on New Zealand dollar FX swaps turnover to be around NZD 150 million per day. However, when we take account of the “pass-the-parcel” trading process in the interbank market, this factor could conceivably have increased turnover by much more.

The remaining growth in FX swap activity can be put down largely to greater foreign investment in New Zealand. Foreign investors use FX swaps to convert foreign currency to New Zealand dollars, to finance purchases of New Zealand assets. Foreign investors using FX swaps are not exposing themselves to movements in the exchange rate, only movements in the interest rate differential between New Zealand and their home country.

Spot and outright forwards trading

Spot turnover more than doubled between 2001 and 2004 (see table 5). The bulk of the increase in spot turnover reflects greater offshore investment in New Zealand assets. Offshore investors have been attracted to New Zealand assets because of the strong performance of the New Zealand economy and the relatively high level of New Zealand interest rates.¹⁵ Offshore investment in New Zealand was also supported by the global recovery in risk appetite (New Zealand is still a small and peripheral market for most offshore investors).

Forwards turnover also increased, but at a lesser rate than spot turnover. The increase in forwards turnover was likely due to an increase in New Zealand export receipts, given that exporters are the main end-users of forward contracts.¹⁶ Exporters use outright forwards to protect themselves

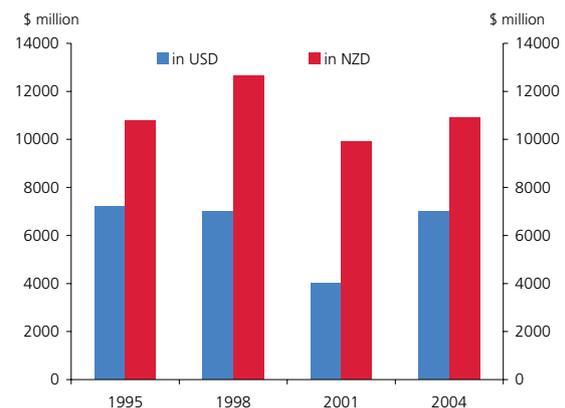
against an appreciation in the New Zealand dollar, which would reduce the value of future foreign currency receipts.

Forwards turnover also tends to generate swap and spot trading. Because interbank price-makers do not generally quote forwards prices, an interbank participant wanting to hedge a forward contract it has just sold to an exporter will pass its position on in the interbank market by transacting two separate swap and spot transactions.

4 The New Zealand foreign exchange market

A smooth functioning domestic FX market is an important foundation for a vibrant financial system. New Zealand is a core trading centre for the New Zealand dollar in a way that goes beyond its share in total trading centre contribution – especially in times of stress or vulnerability. While New Zealand accounts for roughly one fifth of New Zealand dollar trading (see table 4), were a serious economic ‘shock’ to hit the New Zealand economy, domestic banks would be relied upon heavily to provide price-making in the New Zealand dollar. Domestic banks are more incentivised to play this role, given their existing relationships with New Zealand clients and significant franchise value at risk. Thus, we might expect domestic banks to be more committed to providing price-making services in the New Zealand dollar than offshore institutions in the event of a serious shock. Although such a severe shock is a low probability event, it could also come at a high cost, and as such the Bank takes

Figure 9
Turnover in the New Zealand market



¹⁵ Another article in this *Bulletin*, ‘An update on Eurokiwis and Uridashi’, describes a particular form of offshore investment that has received some publicity recently, namely Uridashi and Eurokiwi bond issuance. Uridashi and Eurokiwi bonds are denominated in New Zealand dollars and sold to offshore investors.

¹⁶ Recent work by the Bank (see Phil Briggs, ‘Currency Hedging by Exporters and Importers’, Reserve Bank of New Zealand *Bulletin*, Vol. 67, No. 4, December 2004) suggests that exporters were hedging a lower proportion of foreign currency receipts in 2004 than in 2001. This means the increase in outright forward turnover was presumably driven by increases in export receipts.

a particularly close interest in monitoring the New Zealand market.

Total trading in New Zealand

The 2004 survey shows a recovery in FX turnover in the New Zealand market. FX turnover in New Zealand grew from around USD 4 billion to over USD 7 billion between 2001 and 2004, near its historical average (see figure 9). In local currency terms the increase was slightly less pronounced.

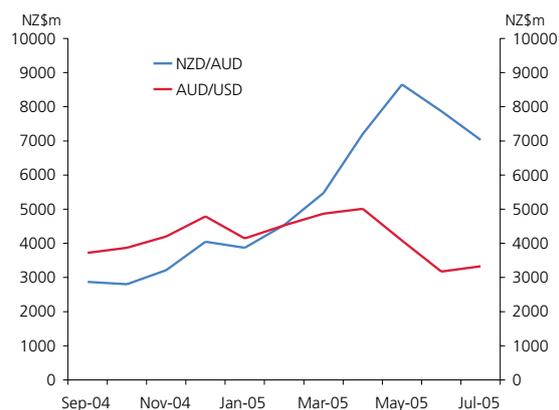
Currency pairs traded

The NZD/USD remains the most traded currency pair in New Zealand, accounting for more than half of all transactions (see table 6). However, NZD/USD trading now accounts for a relatively lower proportion of total turnover compared to the previous two surveys. This change mainly reflects a large increase in the proportion of Australian dollar trading in New Zealand (particularly the AUD/USD).

The increase in AUD/USD turnover has been driven by a growing interest in the NZD/AUD exchange rate, as investors generally trade the NZD/AUD indirectly by buying and selling the NZD/USD and AUD/USD. The NZD/AUD is a popular trade for many investors in the Australasian region who want to take a view on the New Zealand or Australian dollars (or future interest rates in these countries), but do not want to be exposed to US dollar trends. In addition,

many investors believe that the NZD/AUD tends to be driven by a few well-defined underlying factors, including interest rate differentials. Since the April 2004 survey, direct trading in the NZD/AUD in the New Zealand spot market has grown, while AUD/USD trading has stabilised (see figure 10).

Figure 10
Trading in the NZD/AUD and AUD/USD in the domestic spot market



Note: Three month moving average
Source: Reserve Bank of New Zealand

FX instruments traded in New Zealand

Turnover in all the major FX instruments in New Zealand rose between 2001 and 2004. FX swap turnover more than doubled between 2001 and 2004. As we outlined in section 2 and box 2, one important reason for this has been the increase in offshore borrowing by domestic banks (most of

Table 6
Currency pairs traded in the NZ market

	2004		2001		1998		1995	
	USD billion	%						
NZD/USD	3922	56	2630	65	4742	68	3740	52
AUD/USD	1696	24	500	12	655	9	881	12
EUR/USD	534	8	229	6	208	3	934	13
NZD/AUD	234	3	141	4	121	2	141	2
GBP/USD	202	3	137	3	154	2	228	3
USD/JPY	173	2	190	5	695	10	852	12
NZD/other	117	2	149	4	100	1	148	2
USD/other	69	1	23	1	245	4	194	3
All other	61	1	22	1	87	1	81	1
Total	7009		4021		7006		7200	

Box 3

Foreign exchange instruments

Spot transaction

A spot foreign exchange transaction is the exchange of one currency for another, at the spot (or today's) exchange rate. Although the exchange rate is agreed at the time of the transaction, market convention dictates that the exchange of funds (settlement) will occur two business days later (the spot date).

Forward transaction

A forward transaction is identical to a spot transaction, except that the settlement date (and the exchange of currencies) is more than two business days ahead.¹⁷ The forward transaction allows each party to lock in a known forward exchange rate today, with the outright exchange of currency amounts occurring at a future date.

Foreign exchange swap transaction

A foreign exchange swap (FX swap) is an agreement to exchange two currencies at the current spot date and to reverse the transaction at a specified future date.¹⁸ In fact, an FX swap is equivalent to a spot transaction and an offsetting forward transaction rolled into one.

Entering into an FX swap is equivalent to borrowing in one currency and lending in another, allowing management of cross-currency cash flows. The FX swap market can be a more efficient way of borrowing and lending currency amounts than using the relevant currency money markets directly. FX swaps carry no currency exposure because the exchange rate on the spot date and at the future settlement date is fixed at the time of the transaction.

Globally, FX swaps continue to be the most heavily traded FX instrument. A significant reason for this is due to market players' preference to repeatedly transact short-term FX swaps rather than transacting one longer maturity swap.

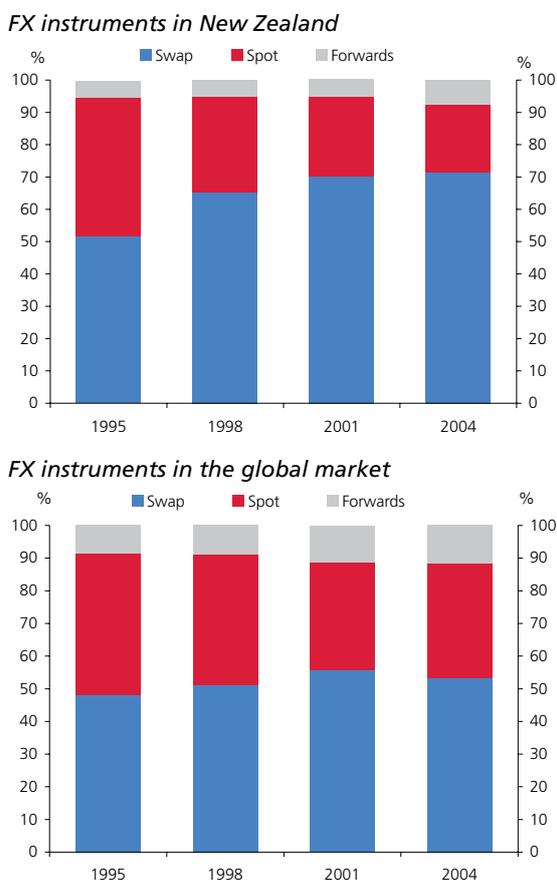
Currency options

A currency option gives the holder the right, but not the obligation, to buy or sell one currency against another at a specified exchange rate, over a specified period. Most currency options are 'over-the-counter', meaning they are written by financial institutions to meet the exact needs of the option buyer.

¹⁷ It is possible to have a forward transaction that settles sooner than a spot transaction. These are called value today and value tomorrow outright forwards, and settlement is either the current day or the next day respectively.

¹⁸ See Hawkesby (1999) for more on FX swaps and currency options.

Figure 11
FX instruments traded in New Zealand and the global market



which will have been exchanged into NZ dollars using FX swaps in the local market).

In line with the greater use of FX swaps by domestic banks, and a global trend towards greater emphasis on swap market activity, the share of FX swap market turnover in the New Zealand market has increased steadily over the past decade (see figure 11). FX swaps are now around 70% of the local FX market.

The proportion of spot turnover in New Zealand has correspondingly fallen over the past ten years, from around 45 per cent of all transactions in 1995 to only 20 per cent in 2004. This is a steeper decline than in the global FX market. One possible explanation is that offshore markets in spot New Zealand dollar have developed over recent years, and taken some business away from New Zealand (most spot New Zealand dollar transactions involve offshore market

participants who will not generally be active during the New Zealand trading day).

Forwards turnover in New Zealand also increased between 2001 and 2004, in line with the growth in exports. The share of forwards turnover in the New Zealand market has increased marginally since 1995.

Currency options turnover actually fell between 2001 and 2004, although this followed a large rise over the previous three years. Currency options turnover has fluctuated around 1 per cent of total turnover in the New Zealand market over the past ten years.

5 Conclusion

Global FX trading increased substantially between 2001 and 2004. This more than reversed the fall in trading between 1998 and 2001. Speculative trading in currencies increased, as investors took advantage of a persistent downward trend in the US dollar and large differences in interest rates between the US and other countries.

Trading in the New Zealand dollar grew at a faster pace than the global average, reflecting the performance of the New Zealand economy and the relatively high level of New Zealand interest rates. Much of this increase in New Zealand dollar trading was concentrated in offshore markets.

On the face of it, the increase in turnover suggests depth in the New Zealand dollar market has improved. However, depth is only one element of market liquidity. We intend to build on the results from the 2004 survey and examine liquidity in New Zealand dollar in the upcoming issue of the *Financial Stability Report*.

FX turnover in the domestic market grew largely in line with the global market between 2001 and 2004. Domestic FX turnover has now fully recovered from the period of financial consolidation in the late 1990s when several banks shifted wholesale operations to Australia.

Appendix

Currency mnemonics

These symbols for national currencies are those routinely used by foreign exchange traders

AUD	Australian dollar	KRW	Korean won
BRL	Brazilian real	MXN	Mexican peso
CAD	Canadian dollar	NOK	Norwegian krone
CHF	Swiss franc	NZD	New Zealand dollar
CZK	Czech koruna	PLZ	Polish zloty
DKK	Danish krone	RUR	Russian rouble
EUR	Euro	SEK	Swedish krone
GBP	Great Britain pound	SGD	Singapore dollar
HKD	Hong Kong dollar	THB	Thai baht
IDR	Indonesian rupiah	TWD	Taiwanese dollar
INR	Indian rupee	USD	United States dollar
JPY	Japanese yen	ZAR	South African rand

An update on Eurokiwi and Uridashi bonds

David Drage, *Financial Stability Department*; Anella Munro and Cath Sleeman, *Economics Department*

This article provides an update on the market for offshore issues of New Zealand dollar denominated bonds, commonly referred to as New Zealand dollar Eurobonds, Eurokiwis, New Zealand dollar Uridashi, and global issues. Net issuance of these bonds has surged in the past two years, driven by strong demand for credit in New Zealand (high domestic interest rates) and by supply conditions internationally (low yields in Europe and Japan). Offshore issuance of New Zealand dollar bonds provides an important channel for New Zealand firms and households to access foreign capital and reduces, at the margin, our cost of capital. These bonds provide a useful source of hedging for New Zealand's foreign currency external debt, reducing the potential for undesirable valuation effects during times of stress. Ex-post returns on Eurokiwi bonds that had matured by the end of 2004 were on average the same, in euros, as German government bonds, but more variable, reflecting exchange rate risk. In theory, the increased supply of foreign capital from offshore New Zealand dollar bonds puts upward pressure on the New Zealand dollar at issue and downward pressure at maturity. However, historical data suggests that any exchange rate impact around the time of maturity tends to be small, consistent with the idea expected effects are priced-in well in advance by forward-looking markets.

1 Introduction

Offshore New Zealand dollar denominated bonds are typically issued by a non-New Zealand borrower, to investors based outside New Zealand.¹ The bonds are often listed on a foreign stock exchange and are usually sold in small 'retail' parcels (as low as \$1,000). These bonds have been issued in the Japanese market (Uridashi),² in the European market and through global issues (issued in more than one market). In this article we refer to European and global issues as Eurokiwis. The offshore NZ dollar bond market is not unique. There are offshore bond markets in many currencies, from the traditional US dollar, Pound, Swiss franc and Yen Eurobond markets, to the newer and smaller markets in Eastern European, Asian and Latin American currencies.

The resurgence in New Zealand dollar offshore bond issuance in the past three years is the third distinct period in the last 20 years, following episodes in 1985 to 1987 and 1996 to 1998 (figure 1). A feature of recent issuance has been the rise in the proportion of bonds issued in the Japanese market. Recent issuance of offshore Australian dollar bonds

has followed a similar pattern (figure 2), but at a rate about half that of New Zealand dollar bonds relative to GDP. The value of Eurokiwi and Uridashi bonds outstanding is now larger than New Zealand government bonds outstanding and on par with total New Zealand dollar government securities on issue (figure 3).³

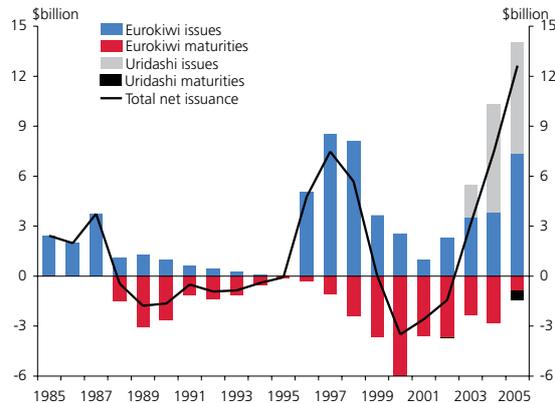
Figure 4 provides an overview of the maturity profile of issuance undertaken since 1985. Over the whole period, issuance has been concentrated in two, three, and five year bonds. Notably, 95 per cent of Uridashi have been issued for two or three year terms. The maturity profile of Eurokiwis issued over the past few years has, however, been a little longer (a weighted average of almost five years) than was the case during the mid-1990s (weighted average of four years). This shift may reflect increased purchases by institutional investors who appear to have a greater appetite for longer term bonds. In some cases, institutional investors have purchased offshore New Zealand dollar bonds as a substitute for New Zealand government bonds (many of the offshore bonds are issued by entities with a similar credit rating to the New Zealand Government).

¹ This article updates an analysis undertaken by Eckhold (1998).

² Around \$3.7 billion of so-called Samurai NZ dollar bonds were also issued in 1996 and 1997 to Japanese retail investors. They have a more complex currency risk structure than typical Eurokiwi issues, and as none have been issued since early 1997, they are not dealt with in this article. However, the general principles behind Samurai issues are the same as for Eurokiwis and Uridashi.

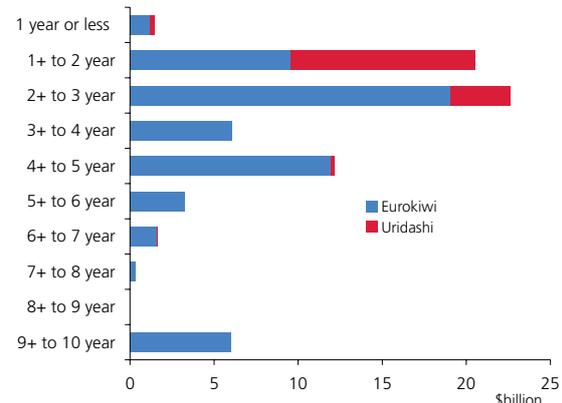
³ However, the volume of secondary market trading in NZ dollar Eurobonds is still small compared to the \$1.7 billion average daily turnover in the government bond market.

Figure 1
Eurokiwi and Uridashi issuance and maturities



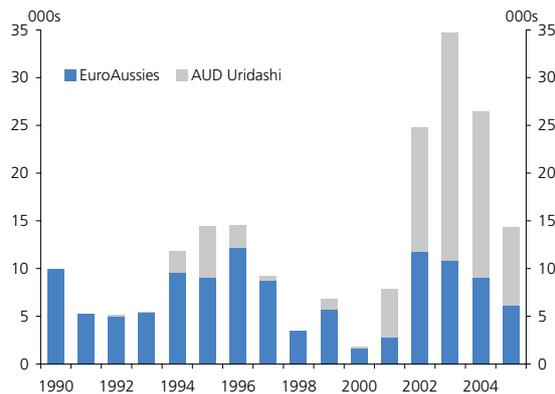
Source: Bloomberg, Reuters and RBNZ. Data for 2005 covers January to August 2005

Figure 4
Original maturity of offshore NZD bonds



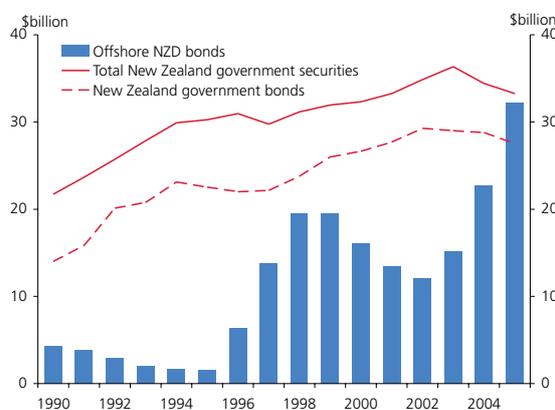
Source: Bloomberg, Reuters and RBNZ.

Figure 2
AUD offshore bond issuance



Source: Reserve Bank of Australia. Data for 2005 covers January to August 2005

Figure 3
Offshore NZD bonds and government securities outstanding



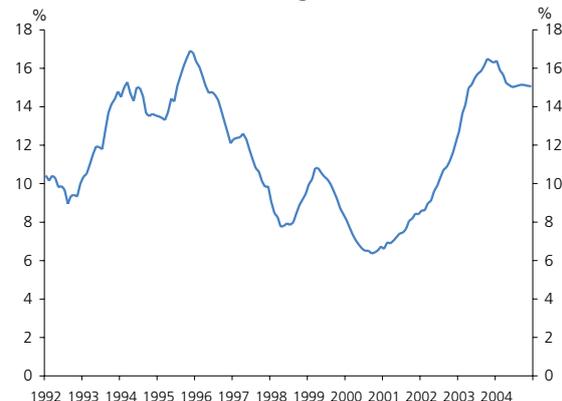
Source: Bloomberg, Reuters and RBNZ. Data for 2005 covers January to August 2005

2 The rationale for offshore New Zealand dollar bonds

As in the mid-1990s, the past few years have seen a period of strong credit growth driven primarily by household credit demand. Mortgage borrowing has been underpinned by a very strong housing market due to strong net immigration and rising incomes in a robust economy. Annual household credit growth has averaged around 15 per cent over the past two years – similar to that seen during the last housing market upturn in the mid 1990s (figure 5).

Strong credit demand has contributed to upward pressure on New Zealand interest rates, by increasing the demand for funding and by boosting inflation pressures in the economy, which has led to firmer monetary policy (higher short term interest rates). Meanwhile, interest rates in Europe, Japan

Figure 5
Annual household credit growth



Source: RBNZ.

and the US have been low relative to New Zealand interest rates. For a given level of risk, higher New Zealand dollar yields increase demand for New Zealand dollar assets in the low interest rate markets, especially in countries with high savings rates such as Europe and Japan.

In theory, New Zealand borrowers could access foreign savings by issuing New Zealand dollar debt directly in the European or Japanese market. While this is possible for some large corporations, most New Zealand corporates and banks are insufficiently well known to be able to directly tap into offshore demand for high New Zealand dollar yields. It would obviously be very expensive and difficult for an individual household to enter this market directly. The market for offshore New Zealand dollar bonds provides an intermediation channel through which offshore investors can access the New Zealand market and domestic borrowers can obtain offshore New Zealand dollar funding.

Figure 6 shows the investment flows associated with a typical Eurokiwi or Uridashi issue. There are two borrowers: a New Zealand household or firm wishing to borrow New Zealand dollars through a New Zealand bank, and a highly rated foreign entity (the Eurokiwi issuer) that requires foreign currency funding. There are two sources of funds: the international capital market (foreign currency funding) and foreign investors who are willing to hold New Zealand dollar assets.

The Eurokiwi issuer, typically a highly rated international bank with a foreign currency funding requirement (e.g. the World Bank), issues New Zealand dollar bonds in a foreign capital market, swaps the proceeds for foreign currency funding in

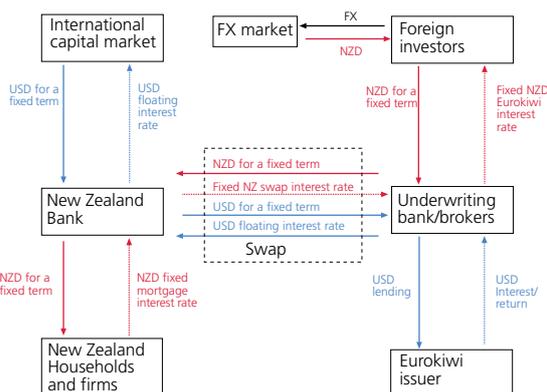
the swap market, and on-lends the foreign currency funds to borrowers (eg, borrowers in the World Bank's developing member countries). On the other side of the swap, a New Zealand bank raises the foreign currency required by the bond issuer and swaps the proceeds for New Zealand dollar funding through the swap market, and on-lends the New Zealand dollar funds to New Zealand households and firms. In essence, each borrows the currency required by the other, and they exchange the proceeds through a swap. The swap is a combined interest rate swap and currency swap known as a cross-currency interest rate swap, and involves an exchange of both the funding and associated interest streams.

Even though the New Zealand bank can access US dollars only at a margin above the issuer's cost of borrowing US dollars, so long as this margin is less than the advantage the issuer enjoys in the offshore New Zealand dollar bond market, there exists an opportunity for both to 'gain from trade'. By borrowing in the market in which they have a comparative advantage,⁴ both the issuer and the New Zealand bank ends up with the currency it needs and pays interest in that currency, and at a lower all-up funding cost than if they each borrowed the currencies they require directly. The structure also allows currency risk to be spread more widely.

As shown in figure 6 an international investment bank is also involved. The investment bank will typically identify the opportunity, bring together the various parties, put the structure together, underwrite the Eurokiwi issue (meaning it assumes some risk), and sell the Eurokiwi bonds to retail (or institutional) investors through brokers in the European or Japanese market.

A number of institutional factors have enabled development of the offshore New Zealand dollar bond market. These include liquid spot and swap foreign exchange markets for New Zealand dollars,⁵ liquid government bond markets that provides benchmarks for the pricing of swaps and New

Figure 6
The structure of a typical offshore bond issue



⁴ The concept of 'comparative advantage' here is no different from that which underpins international trade in goods and services, only here it relates to relative return and packaging of risk.
⁵ See table B4 on the Reserve Bank website for details of New Zealand market turnover, BIS (2004) for global turnover, and an article on the topic in this Bulletin.

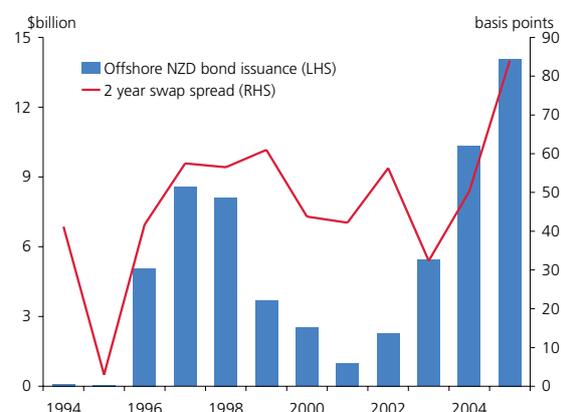
Zealand dollar bond issues, and institutional stability (a commitment not to inflate away New Zealand dollar debt or to influence the value of the New Zealand dollar exchange rate, and an historical record of not defaulting on debt in times of stress).

3 The incentives to issue offshore New Zealand dollar bonds

Issuers of New Zealand dollar bonds in the offshore market generally have no need for New Zealand dollar funding. However, the rate at which highly rated Eurokiwi issuers can borrow in the offshore New Zealand dollar market is typically below the rate at which they can swap New Zealand dollar funds for foreign currency funding (the swap rate), giving these issuers a funding advantage. This funding advantage comes from being a recognised name in the foreign market and having a high credit rating which effectively allows the issuer to separate currency risk from default and country risks.⁶

A widening of the margin between the cost of borrowing from offshore retail investors and on-lending (in a swap) to

Figure 7
NZD Eurobond issuance and the 2 year swap spread



Source: Bloomberg, Reuters and RBNZ.
Note: January to August 2005

New Zealand banks makes issuing Eurokiwis more attractive. Figure 7 shows the volume of Eurokiwi issues and swap spreads over the past 10 years. While there is not a strong relationship over the period, the widening of swap spreads during the past couple of years appears to have been supportive of the resurgence of issuance over this period.

In general, the largest issuers of Eurokiwis and Uridashi so far this year have been the international development banks (left hand panel of table 1). New Zealand affiliated

Table 1

Major issuers*

Largest issuers in 2005 (January to August)	Number of Issues	Total (NZ\$m)	Issuers with New Zealand affiliates (1990-2005)	Number of issues	Total (NZ\$m)
Eurokiwis			Eurokiwis		
GE Capital	6	1,400	Rabobank (Netherlands)	15	1,700
KfW Bank (Germany)	10	1,350	National Australia Bank	15	1,600
EBRD	6	1,000	Westpac Bank (UK)	7	1,308
Province of Ontario	1	750	Telecom NZ Finance	5	410
Inter-America			ANZ National (International)	1	100
Development Bank	2	700	NZ Dairy Board	1	50
Uridashis			Uridashis		
World Bank	10	2,005	ANZ Bank (Australia)	1	320
KfW Bank (Germany)	2	1,496	National Australia Bank	1	315
EBRD	1	752	Westpac Bank (Australia)	2	390
ADB	1	468			
EIB	1	400			

Source: Bloomberg, Reuters, RBNZ.

* GE: General Electric
EBRD: European Bank for Reconstruction and Development
ADB: Asian Development Bank
EIB: European Investment Bank
Note: Eurokiwis includes global issues.

⁶ See Caballero, Cowan and Kearns (2004) for a discussion of separating currency risk.

issuers (right hand panel of table 1) have participated in the Eurokiwi market since the early 1990s, and in the Uridashi market since October 2004.

4 Offshore issues and New Zealand banks

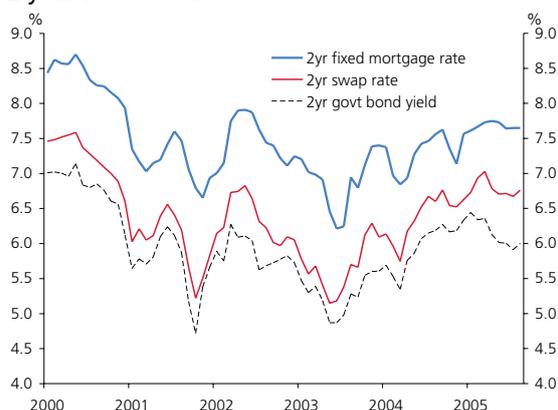
While demand for credit has grown rapidly, the domestic deposit base of New Zealand banks has grown slowly. This has put upward pressure on the wholesale cost of bank funding, and led banks to borrow offshore. Increased funding from non-residents, who may not have a natural reason to hold New Zealand dollar assets, potentially leaves banks vulnerable to currency fluctuations (currency mismatch). This is a risk that New Zealand banks and firms are generally not willing to take on.

While the New Zealand bank could borrow New Zealand dollars offshore directly, it generally finds it cheaper to borrow foreign currency in the international capital market and swap the proceeds and associated stream of interest payments for domestic currency funding. With marginal funding coming from offshore, the effective marginal cost of wholesale funding is the New Zealand dollar swap rate – the interest rate banks pay to swap foreign currency funding and interest streams for New Zealand dollar funding. Consequently, fixed mortgage rates are generally set at a margin over swap rates (figure 8).

The combination of interest rate and currency swap also enables the New Zealand bank to resolve interest rate re-

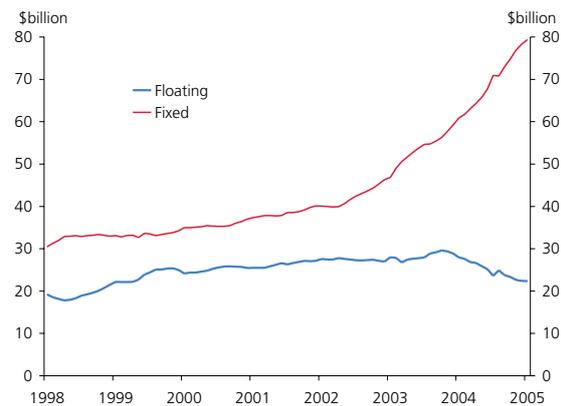
pricing risk (maturity mismatch). As firmer monetary policy has pushed short term interest above longer-term interest rates, fixed mortgage interest rates have tended to be lower than floating mortgage interest rates. As a result, demand for fixed rate loans has increased, as has the proportion of loans on fixed rates (figure 9). However, the bulk of bank funding is short-term – up to 90 days (figure 10). In part this reflects the short maturity of term deposits received (especially when short term interest rates are higher than long-term interest rates), and the fact that banks typically borrow much of their funds at low cost and lend for longer terms to make a profit. By swapping the bank's short term foreign currency funding and (floating) interest rate obligations for longer term New Zealand dollar funding and (fixed) interest rate obligations, banks are better able to manage their interest rate risk.

Figure 8
2 year interest rates



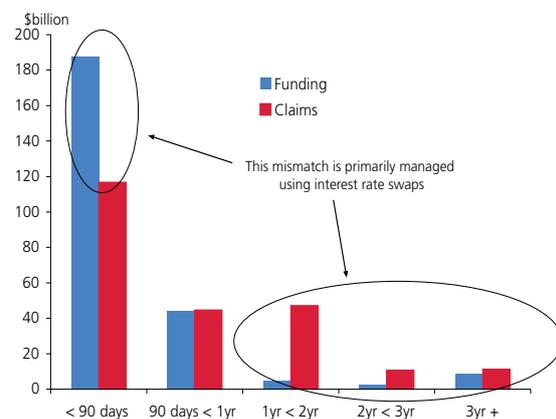
Source: RBNZ.

Figure 9
Floating and fixed rate residential mortgages



Source: RBNZ

Figure 10
Maturity profile of funding and claims of the M3 financial institutions (June 2005)



Source: RBNZ.

5. Incentives to purchase Eurokiwi bonds

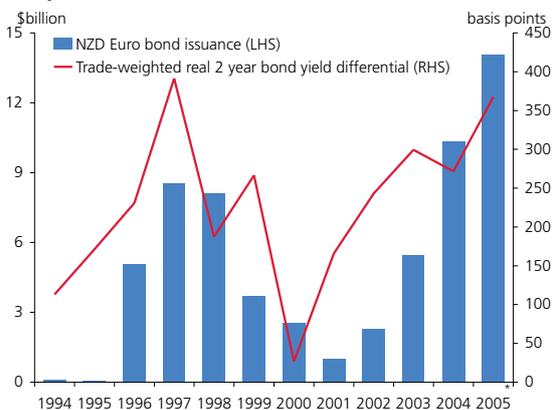
There are two elements to the total return that an offshore investor receives from investing in a New Zealand dollar bond:

- the yield that the bond offers relative to that on comparable investments – both in the investor’s own currency but also in other markets; and
- the expected movement in the value of the New Zealand dollar relative to the investor’s own currency over the term of the bond.

Bond yield differentials

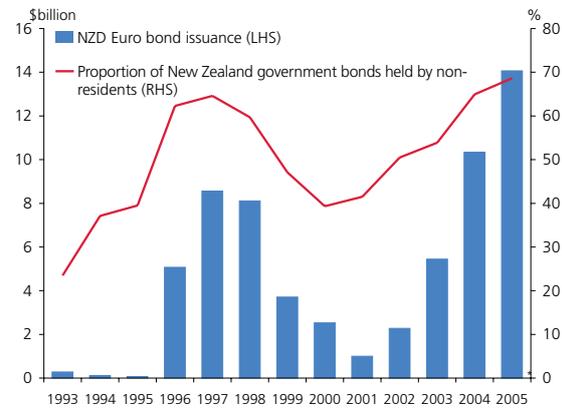
The recent resurgence of issuance and the relatively high levels of issuance seen in the mid-1990s have both been associated with periods when New Zealand interest rates were relatively high. As shown in figure 11, real interest rates in New Zealand have risen significantly over the past few years relative to those in New Zealand’s trading partners. Two types of interest rate differential matter: those between New Zealand and the home countries of potential investors (eg, European and Japanese), and the interest rate differential between New Zealand and countries where investors might otherwise put their funds (eg, the US). The attractiveness of New Zealand’s relatively high interest rates over the past few years, as well as during the 1996 to 1998 period, has also

Figure 11
Offshore New Zealand dollar bond issuance and the yield differential



Source: Bloomberg, Reuters and RBNZ. Data for 2005 covers January to August 2005

Figure 12
Eurokiwi issuance and offshore holdings of New Zealand government bonds



Source: Bloomberg, Reuters and RBNZ
* Janto August 2005 for Eurokiwi issuance. At 31 July 2005 for non-resident government bond holdings

been borne out in strong demand for other New Zealand securities such as government bonds (figure 12).

The exchange rate

It is difficult to know how buyers of Eurokiwi bonds form expectations about currency movements. While we generally think of agents as having rational forward looking expectations, this form of expectation does not sit well with some aspects of the data.⁷ Anecdotal evidence suggests that some investors tend to extrapolate recent trends, so a past trend of a strong New Zealand dollar could stimulate investment as investors expect further appreciation. The general inability to outperform a “no change” exchange rate forecast (Meese and Rogoff, 1983), may lead some investors to trade on yields alone.

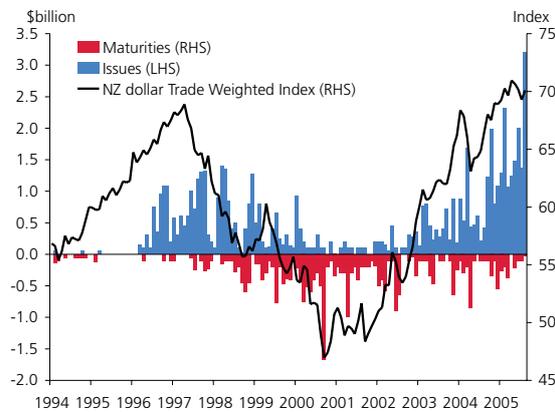
6. Outcomes for investors: ex-post returns

Historically, offshore New Zealand dollar bond issues have been clustered in periods when the New Zealand dollar has been strong relative to its historical average and maturities have been clustered in periods when the New Zealand dollar has been relatively weak (figure 13). This pattern suggests

⁷ For example, the NZD/USD exchange rate lags rather than leads the interest differential. See Sarno (2005) for a recent survey of the literature on exchange rate determination.

Figure 13

NZD Euro bond issuance and the NZD Trade Weighted Index



Source: Bloomberg, Reuters and RBNZ

low ex-post returns on the bonds. To investigate this, ex-post returns were estimated for all issues of Eurokiwi bonds that had matured by the end of 2004 for which data was available, covering 198 bond issues, all of which were issued in the European market.

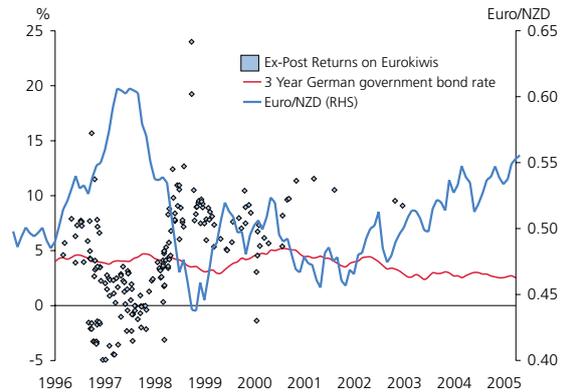
In estimating these returns, it was assumed that (i) investors exchanged Euros⁸ to purchase the bonds into New Zealand dollars at the prevailing spot rate on the date the bonds were issued; (ii) on each date a coupon payment was made and at maturity, investors converted their returns in New Zealand dollars, back to euros, again at the spot rates prevailing on those dates. Internal rates of return were calculated based on the euro denominated earnings from the bonds.

The estimated ex-post returns are shown in figure 14, where each square denotes the estimated ex-post rate of return on bonds issued on the date at which they are plotted.⁹ The returns exhibit a great deal of volatility, ranging between -5 and 24 per cent. These returns are primarily determined by movements in the Euro/New Zealand dollar exchange rate, rather than the coupon rates to which investors are initially attracted. Investors who purchased Eurokiwi bonds when the dollar was near its peak, in 1996–1997, realised returns that were substantially lower than the returns offered on German government bonds.

⁸ Prior to 1999, average of Euro area exchange rates, weighted by share in Euro area external trade.
⁹ Two bond issues included in the sample were made prior to 1996 and are not displayed in figure 14.

Figure 14

Estimated ex-post returns on Eurokiwi bonds



Source: Bloomberg, Reuters and RBNZ

As the majority of bonds were held over periods in which the euro appreciated against the New Zealand dollar, the average ex-post return at 4.11 per cent¹⁰ was substantially lower than the average effective interest rate on the bonds (7.1 per cent), and only marginally higher than the average interest rate on three year German government bonds (4.1 per cent) for the same period. Further, the ex-post returns on Eurokiwis were substantially more variable than the returns on German government bonds, reflecting the exchange rate risk from the point of view of the European investors. The Sharpe Ratio, which measures the return per unit of risk, was 1.0 per cent for the sample of Eurokiwis, compared to 9.8 per cent for German government bonds. Hence, by this metric Eurokiwi risk appears underpriced. This pattern is not, however, unique to Eurokiwis for this short sample period. For example, the average ex-post return on three year US government bonds, in euros, was higher than Eurokiwis in absolute terms (6.2 per cent) over the same period, but lower in risk-adjusted terms (0.7 per cent) and lower than German government bond returns by both measures.

The risk premium on a financial asset is usually in the range of 0.2 to 0.4 per cent per unit of volatility (standard deviation) relative to a less risky asset.¹¹ By this metric, Eurokiwi returns would need to be 76 to 152 basis points

¹⁰ All statistics were weighted by the size of the bond issuances.

¹¹ For example, the historical return on US shares over ‘risk free’ US government bonds is approximately 0.33 times the difference between the standard deviations of the returns, ie, the US share market has returned an excess 5 per cent over US government bonds, but the standard deviation of the returns for the US share market has been 15 per cent higher.

higher than the 'risk free' German government bond rate to be in this range. Instead the average ex-post return on Eurokiwis is just 1 basis point above the 'risk free' rate. The low average return reflects particularly low returns for bonds issued in 1996-1997 which dominate the small sample. If this period is excluded, Eurokiwi risk does not appear to be underpriced.

When interpreting the results, the simple assumptions used to calculate the returns and the small sample employed should not be overlooked. Bonds may not be held until their full maturity (although the secondary market for these bonds is small, there is anecdotal evidence that some bonds are repurchased by brokers some months before maturity); investors may purchase New Zealand dollars at a forward rate rather than at the spot rate, thereby insuring against depreciations in the dollar;¹² there may be diversification benefits to holding New Zealand dollar assets;¹³ and the sample examined is small.

7 Outcomes for the New Zealand economy

The savings-investment gap, capital inflows and the current account

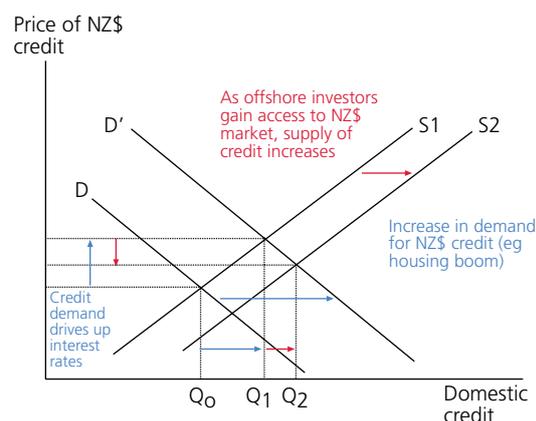
From a macroeconomic point of view, the Eurokiwi market is perhaps best understood as a part of the ongoing process of capital market integration. Diversification of intermediation channels and of capital markets facilitates cross-border arbitrage, providing financing for our external borrowings at lower cost.

In an open economy, if the balance between domestic savings and investment drives domestic interest rates above

world interest rates, then the economy as a whole can invest more than it saves by borrowing from non-residents. In New Zealand, interest rates are high by international standards, implying that the expected return to investing in New Zealand is higher than returns to investing overseas. The difference between national savings and national investment – the current account deficit – is met by an inflow of foreign savings.

From a balance of payments accounting perspective, offshore bonds are not viewed as a capital inflow per se, but as a hedge, where the underlying transaction is typically a New Zealand bank borrowing in foreign currency from offshore markets. In the absence of the bond issue, the New Zealand bank could find hedging from another party through the swap market, at slightly higher cost. Viewed this way, offshore bond issues do not increase the capital inflow (current account deficit) directly. They do, however, increase the available supply of credit and let the demand and supply of credit clear at a lower interest rate, implying a higher level of borrowing (figure 15).

Figure 15
Supply and demand for New Zealand dollar credit



Effects on Interest Rates and the Exchange Rate

As offshore New Zealand dollar bond issues enable an additional group of investors to access the market for New Zealand dollar assets, the supply of New Zealand dollar funding expands, as illustrated by the red arrows in figure 15. The marginal increase in the supply of New Zealand

¹² However, with the forward discount effectively priced off interest differentials, this implies that returns should be equal to German government bond returns, consistent with the low risk of the covered position.

¹³ The diversification benefit depends on the covariance between the returns on New Zealand government bonds and German government bonds, measured in euros. This is slightly negative for 1 and 2 year paper (-0.10 and -0.04 respectively), and positive for 3 and 5 year paper (0.53 and 0.32 respectively). In contrast the correlation of New Zealand government bonds is negative relative to 1, 2 and 3 year US dollar government bonds (-0.37, -0.24 and -0.58 respectively), and positive for 5 year paper (0.19).

dollar funding puts downward pressure on domestic interest rates and upward pressure on the exchange rate.

The lower cost of financing encourages New Zealand residents to increase investment (from Q1 to Q2 in figure 15), widening of the savings-investment gap (the current account deficit). From a current account transactions point of view, some of the additional borrowings will be spent on imports, while any upward pressure on the exchange rate reduces the competitiveness of exports and makes imports cheaper.

In the absence of offshore NZ dollar bond issuance, the demand for credit in New Zealand would need to be met by an increase in savings from domestic sources or from other non-resident sources which would require higher interest rates (i1 instead of i2 in figure 15), implying less investment, more saving, and a smaller current account deficit. The bulk of the capital inflow would probably still occur, though at slightly higher cost with domestic credit expanding from Q0 to Q1. Other channels through which foreign savings may flow to New Zealand borrowers include deposits by non-residents in New Zealand banks; non-resident purchases of domestic debt securities; borrowings by New Zealand banks and corporates from offshore banks; and offshore bond issues by New Zealand banks and corporates. To the extent that foreign retail investors under-price risk (as suggested by modest ex-post returns in euro terms), there may be an increase in borrowing, lower interest rates and a stronger New Zealand dollar than might be optimal, but such an effect is likely to be small and temporary.

While, in theory, Eurokiwi bond issues put upward pressure on the New Zealand dollar and downward pressure on the New Zealand dollar at maturity, we find no statistically

significant evidence of this in the data either in time series regressions¹⁴ or in examining instances of particularly large issues or maturities in the historical sample.¹⁵ So any effect is likely to be either small, temporary or, consistent with forward looking expectations, priced in well before the maturity date.

Currency Denomination of New Zealand's Foreign Debt

New Zealand residents have invested more than they have saved every year since 1973, leading to a large net liability position. As at March 2005, New Zealand's net international liabilities were equivalent to 84 per cent of GDP, made up of a net equity investment position of 20 per cent of GDP and a net foreign debt position of 64 per cent of GDP.

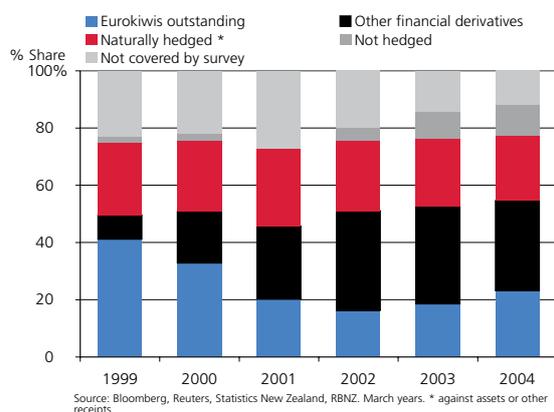
The willingness of non-residents to hold New Zealand dollar risk provides a degree of financial stability for our economy by providing foreign exchange hedging for our foreign currency denominated debt.¹⁶ This comes from exchange rate valuation effects. In the event of a crisis, which would likely be associated with a (possibly sharp) fall in the value of the New Zealand dollar, if our debt is denominated in foreign currency, then our foreign currency liabilities would increase, possibly by a lot, in New Zealand dollar terms. If, however, our foreign debt is mainly denominated in New Zealand dollars, then a fall in the value of the New Zealand dollar has little effect on the New Zealand dollar value of the foreign debt. In New Zealand, about half of our debt is denominated in foreign currency. However, most of the foreign currency debt is hedged. As shown in figure 16 the \$24 billion in Eurokiwis outstanding in March 2005 provided

¹⁴ Regressions for the period 1988–2004 included leads and lags of issues and maturities with and without other explanatory variables. The results do not preclude short-term effects that do not persist for more than a day or a week which would not be captured in monthly data, and such effects may be difficult to isolate in this short sample. Moreover, since foreign exchange markets are forward looking, any expected effect of maturities should be priced well before the maturity date, if not at issue. Even if sales of New Zealand dollars associated with maturities of offshore New Zealand dollar bonds has some effect, it may be spread over a period of months, not only because of expected effects, but because some bonds are redeemed early.

¹⁵ The latter approach is motivated by some of the literature on foreign exchange market intervention which suggests that larger interventions have relatively larger effects on the exchange rate (see, for example, Sheen and Kim, 2004). In about half of the months with maturities over \$500 billion the New Zealand dollar appreciated and in the other half it depreciated.

¹⁶ In general, non-residents have little natural reason to want to hold New Zealand dollar assets since they typically do not have New Zealand dollar liabilities. Exceptions to this include New Zealanders residing overseas and diversification benefits if returns to New Zealand dollar assets are negatively correlated with returns on foreign assets. So in general, the expected return to New Zealand dollar assets needs to be higher than assets in the currency of the foreign investor's liabilities.

Figure 16
Hedging of New Zealand's foreign currency debt



Source: Bloomberg, Reuters, Statistics New Zealand, RBNZ. March years against assets or other receipts.

hedging for 30 per cent of New Zealand's foreign currency debt.

As the outstanding value of New Zealand dollar offshore bonds contracted in 2000, other sources of hedging expanded. The fall in the value of the New Zealand dollar from 1997-2000 probably facilitated this shift. A weak New Zealand dollar increases the value of foreign assets and receipts (natural hedging) in New Zealand dollar terms. A weak New Zealand dollar also provides the pricing incentives for increased hedging, by making New Zealand dollar assets relatively cheap. Conversely, as domestic exporting firms have tended to reduce hedging in the last couple of years as the New Zealand dollar has strengthened, banks' need to find other hedging counterparties has put upward pressure on swap rates, increasing the incentive for offshore bond issuance.

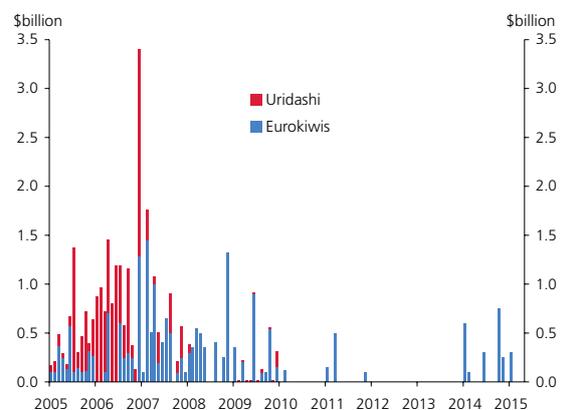
8 Concluding remarks: what lies ahead?

Offshore issuance of New Zealand dollar bonds is likely to continue for as long as the conditions which have fostered it are sustained. Generally, if credit demand remains strong here (and therefore swap rates remain high), foreign interest rates stay relatively low, and investors continue to want to buy New Zealand dollar assets, then offshore bond issuance is likely to continue. Conversely, if credit demand eases (and swap rates fall), or foreign interest rates rise, or investor risk perceptions rise for whatever reason (for example, increased

concerns over the size of the current account deficit, or if investors expect the exchange rate to depreciate) then issuance would likely fall.

Looking ahead, a large volume of offshore issues are scheduled to mature in 2006 and 2007 (figure 17). Large volumes of Eurokiwi maturities in 2000–2002, do not appear to have had adverse effects. As shown in figure 16 the fall in hedging from offshore bonds outstanding was generally offset by a rise in other types of hedging. If banks had difficulty replacing currency hedging, we would expect to have seen upward pressure on short-term interest rates, and on the swap rate in particular, which was not the case (figure 7). Nor is there evidence that in 2000 borrowers had to pay any unusual premium to lenders taking on New Zealand dollar exposure (interest rates were falling), nor is there evidence that maturities put significant downward pressure on the exchange rate.

Figure 17
Upcoming NZD Eurobond maturities



Source: Bloomberg, Reuters and RBNZ

While adjustment to the large volume of maturities in 2000 was not disruptive, the concentration of maturities in 2006 and 2007 potentially represents a point of vulnerability for New Zealand markets, and the Reserve Bank will continue to closely monitor developments in markets where any pressures would become apparent.

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Funding Agreements for the Reserve Bank

Mike Wolyncewicz, *Financial Services Group*¹

This article discusses the policy rationale underpinning Funding Agreements which provide a basis for financing the Reserve Bank's operating expenditure for a five-year period. The article explains the various checks and balances in the funding framework. It then goes on to describe the process by which a Funding Agreement is developed, and provides a brief overview of the profile of the Bank's operating expenditure since 1990.

1 Statutory requirements

Section 159 of the Reserve Bank Act 1989 ("the Act") requires the Minister of Finance and Governor of the Reserve Bank to enter into agreements that provide funding for the Bank's activities. All Funding Agreements entered into to date have been for periods of five years, the maximum length of time permitted by the Act.

Funding Agreements become effective in law only when they are ratified by Parliament. The Act provides that if Parliament does not ratify a Funding Agreement, then the Bank's level of funding provided for in the last year of an existing Funding Agreement is to be carried forward until a new agreement is ratified.

The Bank's primary source of income is interest income from its investment in New Zealand government securities. The portfolio of government securities is financed by the Bank's equity and by currency that has been issued by the Bank and is in circulation. While government securities are interest-earning assets, the Bank does not incur interest costs in respect of currency in circulation and the resulting interest income is used to finance the Bank's operating expenses to the extent permitted by the Funding Agreement.²

Funding Agreements themselves are very straightforward documents. They specify, for each year, the amount of income of the Bank which may be retained by the Bank to meet its operating expenses.

Each Funding Agreement defines the operations of the Bank which are subject to the Funding Agreement. In the

event that there is a change to the scope of the Bank's operations such that it is necessary to either amend the Funding Agreement or negotiate a new agreement, then the amendment or new agreement is required to be ratified by Parliament.

In the event that the Bank's operating expenditure exceeds the amount specified in the Funding Agreement for that year, then the Bank is required to fund the excess from equity. Conversely, any underspending against the amount provided in the Funding Agreement for a particular year is added to the Bank's equity.³

2 Policy intent behind the Bank's funding arrangements

The Bank's funding arrangements differ from most government departments and other government-owned entities for a number of reasons. Most government departments and other government-owned entities are subject to the Public Finance Act and their financial resources are provided by Parliament in the government budget and annual appropriation process.

In contrast, the Bank's use of resources is subject to formal Parliamentary approval at five-yearly intervals, although as explained below, there are many checks and balances in place, which provide both scrutiny of the Bank's performance and incentives for it to ensure its use of resources is appropriate.

¹ Mike Wolyncewicz is the Chief Financial Officer for the Reserve Bank of New Zealand.

² Most central banks around the world typically derive funding from seigniorage – issuing currency that does not incur interest and investing the proceeds in government securities – and this is also the case for the Bank. Where the Bank differs from most central banks is that there is an explicit arrangement that governs the amount of seigniorage that the Bank can retain to fund its operations.

³ The amount available for distribution by the Bank each year is known as notional surplus income. Broadly, this is equal to the Bank's income for the relevant year, to the extent it is realised, less the amount of operating expenditure provided in the Funding Agreement. The Minister of Finance determines the amount of notional surplus income that is to be distributed or added to the Bank's reserves having regard to the capital requirements of the Bank, the views of the Bank's Board and any other relevant matters.

The Funding Agreements are designed to reinforce the operational independence of parts of the Bank. Central Bank operational independence is grounded in the notion that if day-to-day monetary policy decisions were subject to the political process, policy settings would tend to err towards generating higher inflation. This partly reflects the incentive that governments would face to adopt easier monetary policy settings to boost nominal revenues.

If the Bank's annual operating expenditure was required to be subject to annual appropriation by Parliament, it would be possible for its operational independence to be weakened.

The challenge, then, was to design a regime which ensured that the Bank could operate over the medium term with a significant degree of autonomy, yet still remain answerable to Parliament and be subject to high standards of disclosure, review, and accountability for the use of resources.

3 Framework for managing use of resources

The current arrangements allow an appropriate balance to be maintained, with several points at which the Bank's financial decision making is subject to independent scrutiny. It is worth describing the framework for monitoring the Bank's financial performance by walking through the life-cycle for developing a Funding Agreement and administering the Bank.

Approximately nine months before the expiry of a Funding Agreement the Bank commences a strategic planning process aimed at identifying the major developments that will affect it over the following five years. Cascading down from this strategy, the Bank will establish its three-year *Statement of Intent* and its one-year operational plan.

The Bank, therefore, assesses the key influences and decisions that will shape its use of resources for a period of five years ahead. It calculates the costs of various initiatives and expected industry changes, and assesses the priority to be given to each of the initiatives. The Bank models the cost profile of both existing functions and the new initiatives, and arrives at a central scenario of the cost of operating the Bank

for each year of the five years of the period to be covered by the new Funding Agreement.

The Governor submits the plan and proposed level of funding to the Board. The Board's role at this stage is to provide advice to the Governor. The Board needs to be satisfied that the Bank will have adequate resources to carry out its statutory duties. Equally, once a Funding Agreement is in place, the Board has a duty to monitor the Bank's use of resources, so that it can be assured that the spending is well managed.

Having received the Board's input, the Governor submits the proposed Funding Agreement to the Minister of Finance who asks Treasury to scrutinise the Bank's bid. Treasury undertakes a detailed review of the Bank's submission, as it does for government departments in respect of their annual expenditure proposals, and reports back to the Minister. Negotiations occur and, once the proposal is finalised, the Minister and Governor execute the Funding Agreement.

The Funding Agreement must be tabled in Parliament within twelve sitting days of it being signed. The Minister proposes a motion that the House ratify the Funding Agreement.

Given the many layers of review by the Board, the Minister, Treasury, and finally Parliament, together with relevant media coverage, the Bank's proposals need to be firmly grounded, easily justified, and not excessive.

Equally, there are strong incentives for the Bank's expenditure not to exceed the levels provided for in the Funding Agreement. While the Bank has not yet exceeded those levels in any year, such an event would be disclosed in the Bank's *Annual Report* and would no doubt be subject to review by Parliament's Finance and Expenditure Committee and media commentary.

There is inevitably a high degree of uncertainty in forecasting expenditure over a five year period, so it is appropriate that modest provision be made within the Funding Agreement for risks and initiatives that cannot reasonably be foreseen over an extended time.

4 Ongoing financial review

The Funding Agreement provides a broad framework for setting expectations for the cost of delivering services. It does not constrain the Bank's expenditure on individual functions; instead it provides flexibility to redeploy resources as priorities change. Other checks and balances exist to ensure that changes in resource use are reasonable and justified.

Each year the updated *Statement of Intent* records the Bank's objectives and strategies for the current and following two years. The *Statement* also requires that the Bank disclose its budget for the first year of the three-year period. The draft *Statement of Intent*, like the Funding Agreement, is subject to review by the Bank's Board. The Minister of Finance must receive a copy on or before 31 May each year and the Governor is required to consider any comments that the Minister has before publishing the *Statement of Intent* on or before 30 June. The published document must be tabled in Parliament.

The Bank's projected statement of financial performance is developed as the result of a detailed annual budgeting and planning process. Having established objectives for three years and agreed detailed priorities for twelve months, Bank departments develop detailed financial plans. These are subject to review by a Planning and Budgeting Working Group and a committee of the senior management – known as the Governor's Committee – before the Governor requests advice from the Board and the budget is finalised.

Treasury provides input to the annual budgeting process by reviewing the draft *Statement of Intent* on behalf of the Minister.

Actual financial outcomes against plans are reviewed by the Bank's Board at each Board meeting. The Bank's *Annual Report* includes a review and commentary on financial outcomes against budget and against the previous year's outcomes. The *Annual Report* is also tabled in Parliament and is subject to review by the Finance and Expenditure Select Committee.

It can be seen from the above that while the Funding Agreement affords the Bank a substantial degree of autonomy, there are strong mechanisms and incentives in

place to ensure that it remains fully accountable for financial outcomes.

5 Recent changes

The Funding Agreement and related legislation have been refined over the last five years or so. The Funding Agreement for 2000-2005 was developed so that the binding constraint agreed to was net expenditure; that is, expenditure incurred after deducting revenue received from designated sources such as from disposal of obsolete coins, sale of collectors' currency, rental income, and fees for provision of registry and banking services. The rationale for the change was that if the Funding Agreement focused only on gross expenditure then it would create perverse incentives for the Bank to avoid investing in services that created a positive economic return. For example, the Bank would have no incentive to invest in changes to its building, which could generate long-term rental income, if the focus were on expenditure rather than net expenditure.

At the same time the Bank brought within the scope of the Funding Agreement its registry and banking operations. Prior to June 2000, these activities were outside the Agreement, with any profits being directly added to equity, and conversely any losses financed by Bank equity. Once the Bank resolved the issue of perverse incentives referred to above, there was no reason to treat registry and banking activities differently from other Bank functions and so, from 2000, these functions were included within the ambit of the Funding Agreement.

In December 2004, section 159 of the Act was amended in order to resolve some technical difficulties that existed with respect to the Agreement. In particular, the section referred to "expenditure" rather than "operating expenditure". Technically, the Bank could have been required to agree all "expenditure" including interest expenses and foreign exchange losses at the time the Funding Agreement was negotiated. Clearly the ability to forecast such expenditure is impossible given the nature of the Bank's business. Failure to agree on a level of expenditure for such items could have impacted the calculation of income available for distribution and in turn affected the Bank's capital. Acknowledging

this, the Funding Agreement was amended in March 2004 when the Bank acquired an increased capacity to intervene in foreign currency markets. The Act was subsequently changed so that Funding Agreements focus on “operating expenses” rather than “expenditure”, which was always the intention.

6 Outcomes under successive Funding Agreements

Figure 1
Actual net expenditure and agreed levels of operating expenditure⁴

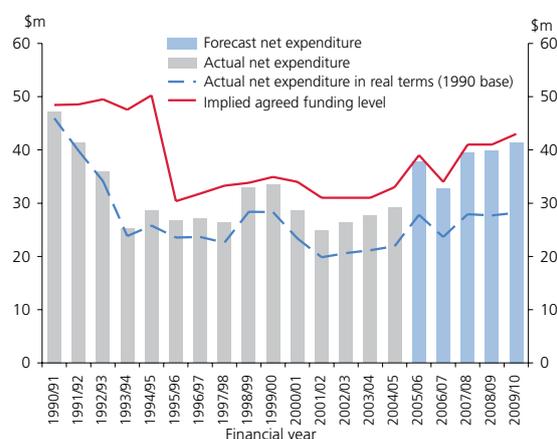


Figure 1 shows the level of net operating expenditure incurred by the Bank under successive Funding Agreements over the past fifteen years, together with the forecast expenditure and Funding Agreement levels for 2005–2010.

The graph shows that the Bank has undergone significant change in its expenditure profile. During the 1990s it achieved large reductions in both nominal and real levels of expenditure as the Bank was restructured and various policy reforms were put in place. In particular, the currency function underwent material change, including the closure

of the Bank’s Auckland and Christchurch operations; the introduction of polymer notes, and the adoption of a wholesale distribution model. In addition, major changes occurred with respect to banking supervision with the adoption of a disclosure-based regime in the mid-1990s. In 2000 the Bank outsourced its registry operations and in 2004 it exited the retail registry operations business entirely. In 1999, the Bank restructured those of its operational departments that were charged with internal service delivery so as to consolidate operations into fewer operating divisions. In 2003 the Bank merged its Banking System and Financial Markets Departments into a new Financial Stability Department, and reinvigorated its supervision of the financial system.

Having achieved significant cost savings during the early 1990s, the Bank was able to largely contain costs during the period 1994 to 2005. During the final years of that period the Bank commenced a programme of major capital investment to replace systems which were fully depreciated and coming to the end of their economic lives.

In particular, the Bank’s document management system, its treasury system, note counting equipment, security systems, and real-time gross settlement systems required major capital expenditure, all of which will significantly increase depreciation expenditure during 2005–2010.

Other major drivers of cost increases during this upcoming period include risk reduction measures, in particular further investment in the Bank’s business continuity planning capability to meet higher standards. This involves the purchase of additional systems capabilities and the establishment of back-up sites/capabilities in Wellington and out of Wellington. This will provide greater assurance that the Bank can continue to operate across a range of services in the most extreme disasters.

Finally, the Funding Agreement for 2005–2010 makes provision for additional resources in the Bank’s regulatory arm to meet increased demands, especially with respect to international developments such as Basel II, trans-Tasman cooperation, and payments systems developments.

The Bank still continues to innovate, looking for efficiencies and ways to increase effectiveness. From 2006/07 the

⁴ From 1 July 2000, the Funding Agreement was expressed as a level of net expenditure which took into account revenue from specified activities. For the year ended 30 June 2000 and earlier years, the Funding Agreement was based on gross expenditure. For the year ended 30 June 2000 and earlier years, figure 1 presents the implied Funding Agreement level on a comparable basis, that is by deducting from the agreed levels of gross expenditure revenue earned from those specified activities.

5 cent coin will be withdrawn from circulation and the 10, 20 and 50 cent coins replaced by lighter and less expensive coins made of plated steel. This will save \$2 million per annum in the cost of issuing new currency.

7 Conclusion

The Bank's Funding Agreement gives it significant financial autonomy which helps to guarantee the ongoing effectiveness of monetary policy. This autonomy is carefully

balanced by an extensive set of checks and accountability measures which ensure that the Bank makes responsible use of resources at its disposal.

A review of the Bank's operating expenditure shows that the Bank has achieved significant changes and has been innovative in delivering its statutory outputs and achieving material reductions in its cost profile. Equally, the process works well in making sure the Bank has access to appropriate resources when challenges facing it call for additional resources to be deployed.

SPEECHES

New Zealand Payments System

An address by Dr Alan Bollard, Governor, Reserve Bank of New Zealand, to the Institute of Finance Professionals New Zealand

11 August 2005

Introduction

Today I'm going to talk about one of our key pieces of infrastructure – our payments system. I believe it is the first speech by an RBNZ Governor dedicated to that topic. I'm pleased to take it up, because it's an area where we have spent quite a bit of effort in recent years, and because it is of very significant importance to the functioning of the economy. It is also closely linked to one of the Reserve Bank's statutory objectives – "avoiding significant damage to the financial system that could result from the failure of a registered bank". I'm certainly hoping that I never have to deal with a bank failure in New Zealand, but we do need to be very well-prepared for such an event because of the need to act very quickly and confidently in order to minimise systemic impacts.

Most of the time, the various elements of the payment system work very well and are very reliable – and we often take this pretty much for granted. However, any kind of disruption can be at best very inconvenient for users – as any of you who have been in a supermarket queue when the EFTPOS system goes down will know well. Some events can quite quickly cause more serious disruption, and have an impact on economic activity. Some of you will have been affected by the recent Telecom outage, which prevented some entities from accessing payment systems for a period, and which disrupted both trading and settlement activities. There have been other incidents like this from time to time, sometimes affecting only one participant directly, sometimes affecting many. I will return later to the lessons we have learned from these experiences.

The payments system

The payments system consists of all the diverse arrangements that we use to transfer money, whether using currency, paper instruments such as cheques, or a variety of electronic channels. It is something we all use every day – whether

to purchase a book from someone using cash, buying it on Lambton Quay with our EFTPOS card, buying it from Amazon using our credit card, or – for many of you – to settle trades in the equity, debt or foreign exchange markets, in a number of different ways. And these transactions add up to quite a lot – on average more than \$35 billion per day in the 'wholesale' systems last year, and about \$6 billion per day in the 'retail' systems. The numbers of transactions are also striking – only a little over 4,000 per day in the wholesale systems, but more than 4 million per day in the retail systems.

I might note at the outset that those transactions I just mentioned are all actually quite different in their characteristics. The first one – buying something with cash – is very simple: it just involves handing over some currency. No bank or settlement system is involved, and no record of the transaction is necessarily kept. That makes it all very quick and convenient, but the anonymity can lead to some problems as well, in respect of money laundering for example. That is a topic for another day. Note too that the Reserve Bank is a key participant in cash transactions, in the sense that it is providing a medium of exchange of undoubted quality. Aside from forgeries, no-one has to think about whether the money is 'good'.

The second transaction – buying a book on Lambton Quay – introduces some new elements. First, typically a couple of banks get involved in the process – the ones where the bookseller and ourselves have our accounts. There's a pipeline going from one account to the other which is not instantaneous, and the bank receiving the money will often not let the recipient draw on it until it is sure that it has itself received the money from the paying bank.

Secondly, customers wishing to make or receive payments need to maintain a transaction account with a bank – and this does involve them in accepting some risk in the event that their bank gets into trouble. In this sense, money 'in the bank' is not quite as safe as Reserve Bank money.

Thirdly, a merchant is now involved, and merchants participate in things like card schemes on a different basis from cardholders – for example, merchants may bear some risks of losses when cards are used fraudulently; and banks may bear some risks when merchants do not deliver the goods paid for.

The third example, buying the book from Amazon, adds another dimension, the cross-border element of the transaction - now a local and a foreign bank are involved in the 'pipeline', and the payments may be governed by legal and contractual arrangements that differ from country to country. As an aside, the ease with which we can now conduct international transactions, and pay for things when we are traveling overseas, would have been the envy of previous generations.

In the wholesale financial markets, a final consideration comes into play – typically a local 'payment' is made in exchange for the 'delivery' of a security, or of some foreign currency. Not so long ago, there were often quite extensive delays between payment and delivery, implying significant risks for purchasers if the counterparty responsible for delivery failed in the interim. As I'll discuss more later, we have now moved to the happy position where most of these transactions can now be conducted on a simultaneous delivery-versus-payment (DVP) basis.

There are two main lessons to draw out of these examples.

First, the payment system is not a single entity. It is, in fact, quite a complex collection of disparate arrangements, with different participants, different rules, and different processes in each place. While there are similarities in the way things work internationally, each country also has its own idiosyncratic elements, reflecting its legal and banking history. The arrangements overlap and intersect at various points, and I have more than once heard them described as spaghetti. Of course, there is nothing wrong with serving spaghetti as long as you know how to handle it.

Secondly, some of the key features I have described – in particular, the existence of sometimes long pipelines between customers and banks, and the dependence on banks and their infrastructure providers – create risks for all

the participants in the system, and those risks need to be understood and managed appropriately.

I'm now going to talk about some of the significant changes in the payments system in recent years, and then about the various different roles that the Reserve Bank plays in this area, and how we go about some of them. I'll talk a bit too about the very successful risk-reduction programme that we have been pursuing. On the way, I'll have a few things to say about unfinished business and future business.

Recent innovations

There have been some fairly dramatic changes to the payment system over the last 20 years. Prior to about 1984, the system was almost entirely based on 'paper', with currency and cheques being the dominant forms of payment for both retail and wholesale transactions. The first credit cards were issued in 1979, but these were also paper-based initially. The electronic era began about 1984, when EFTPOS emerged in the market. New Zealanders were enthusiastic adopters of EFTPOS, and New Zealand was – and still is – a world leader in the penetration of this technology. More recently, the use of PC-banking and the internet to initiate transactions have been growing rapidly in popularity. Cheques are progressively disappearing, but – contrary to longstanding predictions of a 'cashless society' – the use of currency has continued to grow.

In the wholesale markets, the Kiwi Interbank Transfer System (KITS) began in 1987, to handle electronically some payments between the four big banks. It was replaced in 2000 by the Same-day Cleared Payment Service (SCP), which can handle interbank payments and payments between bank customers on a real-time basis. In 1990, the Reserve Bank commenced to operate the Austraclear system under licence. This system, as you know, provides a depository for debt and equity securities, the facility to transfer these securities on a real-time delivery-versus-payment basis, the facility to make cash payments, and a platform for the automated provision of intra-day liquidity to the banking system.

Settlements amongst the banks in respect of each day's transactions used to take place on the books of the Reserve Bank – everything was netted down to a single number that

each bank either owed to the system, or was owed by the system, and the banks' accounts at the Reserve Bank were debited and credited accordingly. No doubt this procedure started with a ledger, a clerk and a quill pen, and it didn't change much until 1998 when the electronic Exchange Settlement Account System (ESAS) was introduced. This system enabled three main changes:

Large interbank transactions could now be settled on the Reserve Bank's books at any time during the day, without having to wait until the end of the day, and without having to be included in the end-of-day netting wash-up. This is called Real-Time Gross Settlement (RTGS).

Austraclear transactions were now also settled using ESAS, giving the securities market delivery-versus-payment in central bank money (Austraclear had previously been DVP in commercial bank money). New Zealand was one of the earliest countries in the world to achieve this outcome.

Reserve Bank operations to provide intra-day liquidity to enable these real-time transactions were automated through an 'autorepo' facility

Finally, late last year, the New Zealand dollar entered the CLS system, which provides a payment versus payment service for settling foreign exchange transactions. This substantially reduced the largest remaining settlement risk for the New Zealand banking system, and the design also significantly economises on the liquidity required to make foreign exchange settlements. CLS is connected to ESAS in order to achieve this. CLS has been very successful in New Zealand, and has already achieved a higher penetration in the New Zealand market than in any other country, some of which joined CLS back in 2002.

Overall, it would seem that New Zealanders and New Zealand businesses get pretty good payment services by international standards – they are efficient, up-to-date, reliable and accessible. Our small size may actually be an advantage, in that it has been relatively easier to innovate when a small number of similar institutions are involved. In addition to improving customer services, some of the innovations I have talked about have been motivated by the need to reduce risks, and I will return to that topic.

The Reserve Bank's roles

The Reserve Bank has been part of the payments system from its inception, but for most of the period had little involvement in a policy or operational sense. The various entities involved in the clearing and settlement of payments were owned and operated by the private sector. Of course, in the days when we were the Government's banker, we looked rather like other banks, with tellers and ledgers and all that stuff, and we were heavily involved with cheque processing and so on. We also had some other significant clients, like the former Dairy Board. But those parts of the business largely left the Bank during the 1980s reforms.

Currently, the Reserve Bank has a number of roles in the payments system, and I have mentioned some of them already:

- Issuer of currency – coin and paper (or these days polymer) 'money'
- Provider of exchange settlement accounts – electronic 'money'
- Provider and operator of ESAS – the facility to use our accounts for real-time transactions
- Provider and operator of Austraclear – securities trading and settlement
- Provider of liquidity to the banking system
- User of the system for FX and securities trading and settlement
- Regulator of banks and overseer of the payment system

We are very conscious that we are wearing all these different hats, and that they could involve somewhat different interests. We therefore manage each of these roles separately, although with close coordination, and in practice we find that they rarely come into any conflict.

Almost all of the roles are core businesses for central banks. The only exception to this is the Austraclear operation, which is more commercial in nature, and may not be an essential component of the Reserve Bank. We picked up the Austraclear business in the first place because we were interested to ensure that the New Zealand market is

as well-served as possible, in terms of the efficiency and integrity of the clearing and settlement systems, the quality of risk management, and the recognition of the interests of all stakeholders. Those outcomes remain our long-term goals. We are committed to maintaining the quality of the Austraclear service for so long as it has a role to play, and we have recently committed to a major upgrade of the Austraclear system.

Risk reduction and dealing with settlement failures

Our regulatory role started to develop around 1990, a few years after we had entered the field of formal bank supervision for the first time in 1987. That responsibility, together with an increased focus on the issues internationally, awakened our interest in the size and nature of payment system risks. We developed the view that the existing understandings about what would happen in the event of a bank failure were probably not very workable or satisfactory, and initiated a dialogue with the industry aimed at ensuring that payments system risks were identified, monitored, and managed appropriately. We were also keen to ensure that the status of transactions, including those in the various 'pipelines', was certain at all times, and that payments system arrangements, including failure-to-settle arrangements, were legally, financially and operationally robust. In other words, the arrangements have to work both in theory and in practice, and under acute time pressures. By financial robustness, I mean that any losses which do occur can be absorbed without strain by those bearing the losses. These remain our goals.

Much has been achieved over the last 15 years. The moves to real-time gross settlement and the entry of the NZ dollar to CLS were both landmarks in stripping large risks out of the system. They have been supported by some legislative changes that have underpinned them, and which provide a high level of certainty. A New Zealand Bankers' Association project to review the failure-to-settle rules for retail transactions has led to significant improvements and greater clarity. I am grateful to everyone who has contributed to

these developments – our payments system has become much more resilient as a result.

In terms of our goals, we have now achieved a high degree of legal robustness, and much improved financial robustness. I think there is further scope to move some large payments which still go through the deferred settlement systems into the real-time systems, in order to further reduce financial risks for both banks and their customers, and this might require some changes to bank customer behaviour. A few other things may also need to be tidied up, but reasonably soon we ought to be able to reach a point where we can say that financial risks arising within the payments system itself are no longer of systemic significance.

However, operational robustness remains a systemic issue, and it is probably going to be our main preoccupation in future. Two main things are driving us here. First, we have all seen enough incidents where operational failures have disrupted the payments system to cause us concerns. Some of these have arisen in individual banks, both large and small, but have had the potential to spill over and affect other participants, and/or require emergency liquidity support. Others have affected a whole system or network, including the recent Telecom outage and some brief disruptions to New Zealand's access to the SWIFT network. What these experiences have shown is that:

- serious problems can arise without warning;
- they can escalate quickly if not resolved promptly;
- there is sometimes inadequate appreciation of the impact on other participants;
- communications to affected parties are not always adequate;
- diagnosis and repairs take time;
- there are not many – or any – fallbacks when some kinds of disruption occur;
- business continuity arrangements do not always provide the answers in a sufficiently timely manner.

The incidents have also sometimes provided confirmation that Murphy is alive and well – problems with completely

unrelated causes can pop up simultaneously, with nasty consequences.

Another area of operational risk is fraud, and we have all seen reports of new kinds of fraud emerging. The New Zealand financial system has not been a major fraud target to date, but no-one can afford to be complacent about the potential risks as our electronic dependence continues to grow. Sometimes there is a difficult balance to be struck between making things as easy as possible for genuine customers and as hard as possible for fraudulent customers. Banks and other payment system participants have plenty of incentives to protect the systems from fraud, and to detect it as quickly as possible when it happens, and the Reserve Bank may not have a great deal to add. The important thing from our perspective is that risks should be managed by those best placed to manage them, typically the banks themselves. We do not think that bank customers should be unduly exposed to risks that they are not reasonably able to identify or manage.

Our second driver comes from our ongoing work on bank failure management, which some of you will be familiar with. While we are not expecting any banks to fail, we do want to be in a position to discharge our legal responsibilities if one does get into trouble. And one of the things we may well want to do is to continue to operate a bank in statutory management, and keep it as a full participant in the payments system. We also need to be able to act quickly in respect of transactions that are in the various pipelines at the point where a statutory management is declared. To do this, we potentially need fast access to New Zealand management, technological and payments system resources.

I noted earlier the complexity of the payments system overall, and I don't think that some of these questions have particularly easy answers. We are addressing some of them through our outsourcing policy, but others are likely to require alternative approaches, and some further cooperation with the industry. The goals include ensuring that key systems are designed to be 'high availability' ones; that robust back-up arrangements are in place wherever feasible; that business continuity plans are effective and mutually consistent; and that rapid decision making and communication capability

are readily available. For us, this is very much 'work in progress' at this point.

Legislative powers

Finally, in talking about regulation I should note that in 2003 the Reserve Bank was given some formal legal jurisdiction over the payments system for the first time, in a new Part 5B of the Reserve Bank Act. The powers basically give us the right to obtain and publish information, and thus to throw a spotlight on any issues of public interest. They do not give us the kind of authority to scrutinise and determine prices, for example, that the Payment System Board has in Australia: here, that kind of role is performed by my former colleagues in the Commerce Commission, and we are very comfortable with that division of labour. The Reserve Bank is an advocate for competition and suitably open access rules in the payment system.

In practice the new legislation provides a more formal basis for the kinds of things we have been doing, and does not signal any change in direction. We decided recently to publish the principles we would follow in our payments system oversight work, and these have been put on our website today. You will be able to read them there, so I won't go into them in detail. They do include a largely unchanged restatement of the goals we set ourselves a decade ago:

They state that a sound and efficient payment system is one:

- that does not generate high levels of risk to participants or to users of financial services, and in which any risks that are generated are managed appropriately by system participants;
- that can continue to operate without disruption in the event of the sudden financial or operational incapacity of a participant, or following other types of financial crises or natural disasters, etc;
- that incorporates delivery-versus-payment arrangements where appropriate, and especially with respect to high-value transactions;

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- in which the status of payments is certain at all times, and, in particular, in which the attributes of ‘finality’ and ‘irrevocability’ are supported;
 - in which payment services are efficient and reliable, and are responsive and relevant to customer needs; and
 - that is open, flexible and competitive, with no unwarranted barriers to entry.

We have noted in the document that these goals are not an exhaustive list and may evolve over time. They do reflect recent and currently significant payments system issues. They also overlap substantially with the main international standard in this area, the Core Principles for Systemically Important Payment Systems released by the Committee on Payment and Settlement Systems in 2001.

Conclusion

Our aims have been to achieve a payments system that is sound and efficient, and – in particular – that is legally,

financially and operationally robust. We have made excellent progress in improving legal certainty, reducing financial risks, and improving some aspects of operational robustness. However, the system now involves increased interdependence amongst all the participants, and more stringent timing requirements, particularly since the entry into CLS. Moreover, the increased dependence on technology that we have seen develop implies that technological risks have increased commensurately, and probably now pose the greatest potential systemic threat to the payments system.

It is clearly in all of our interests that we fully understand these issues and risks, and ensure that we all have the capacity to manage them properly, so that the payments system meets the needs of the financial system and the wider economy well, and is fully resilient to stresses and strains. I am grateful for the good cooperation with the industry which has enabled the progress we have made, and I look forward to that cooperation continuing.

NEWS RELEASES

New bond lending facility

14 July 2005

The Reserve Bank of New Zealand today announced that, as from 18 July 2005, it will operate a bond lending facility. By providing liquidity to the government securities market through this facility, it is expected that the Bank will be able to alleviate the occasional pressure that arises in the New Zealand inter-bank payments and settlement system. The decision to offer this facility reflects the Bank's statutory objective to promote the soundness and efficiency of the financial system.

Over recent months the Bank has observed growing pressure on the collateral that is available to the banking system (ie, government securities) for settlement purposes. This pressure reflects a combination of a relatively static volume of government securities and rising demand for them (in part for prudential and settlement purposes). The May 2005 *Financial Stability Report* highlighted that the Bank was considering ways to address this issue.

The bond lending facility will be available on a daily basis to counterparties who have signed an Inter-day Master Repurchase Agreement. Securities for the facility will be sourced from the Bank's New Zealand government bond portfolio. Bonds will be available for borrowing from the Bank at a margin that will be set so as to ensure that, in normal circumstances, market participants will trade amongst themselves.

For more information on the operational details, please refer to the latest copy of the Bank's Operating Rules and Guidelines, which can be found at <http://www.rbnz.govt.nz/finmarkets/liquiditymanagement/0145254.html>.

OCR unchanged at 6.75 per cent

28 July 2005

The Reserve Bank has left the Official Cash Rate (OCR) unchanged at 6.75 per cent.

Reserve Bank Governor Alan Bollard said: "The economy has recently shown signs of softening. GDP growth has continued to ease over recent quarters, particularly in sectors such as manufacturing that are exposed to the strong

exchange rate. Indicators of business activity have been pointing downwards for some months and it now appears that household consumption growth is also beginning to weaken. However, residential housing market indicators remain firm, representing an upside risk for the future path of household spending and inflation. We view the overall easing in activity as broadly consistent with our June *MPS* economic outlook.

"Inflation pressures nevertheless remain present. Several years of strong growth have led to productive resources becoming stretched and the resulting inflation pressures will take some time to unwind. Moreover, additional short-term inflation pressures have recently emerged as a result of surging oil prices and the waning impact of the strength in the exchange rate over recent years. These short-term inflation pressures, which could easily be exacerbated, are now expected to push CPI inflation temporarily above 3 per cent over the coming quarters.

"Looking further ahead, we expect that current policy settings will be sufficient to achieve our objective of 1–3 per cent inflation on average over the medium term. However, in the current environment, monetary policy must remain vigilant. We remain vulnerable to upside inflation risks and monetary policy must continue to work at reducing the ongoing excess demand pressures. A firm policy stance is also necessary to prevent the expected short-term inflation pressures from becoming entrenched in inflation expectations. A further tightening of policy could not be ruled out in the event of a resurgence in medium-term inflation pressures. Certainly there remains no prospect of a policy easing in the foreseeable future."

2005 Monetary Policy Challenge winner announced

11 August 2005

Nelson College has won the Reserve Bank's 2005 Monetary Policy Challenge school competition.

The competition involved students from 40 secondary schools becoming mock central bankers and preparing written advice on what they think the Official Cash Rate should be. The OCR is an interest rate set by the Reserve

Bank to implement monetary policy, so as to maintain price stability. The competitors then presented this information to a panel of Reserve Bank judges and participated in a question and answer session conducted by Reserve Bank economists.

27 July	OCR announcement
14 September	Monetary Policy Statement
26 October	OCR announcement
7 December	Monetary Policy Statement

The National Final was held today at the Reserve Bank, with Nelson College emerging as winner ahead of Burnside High School and Tauranga Girls' High School, who were placed second and third respectively. The other competitors were King's College, Hutt Valley High School and Logan Park High School.

The Reserve Bank reserves the right to make changes to this schedule, if required due to unexpected developments. In that unlikely event, the markets and the media will be given as much warning as possible.

"The Monetary Policy Challenge brings to life for students the dilemmas that central bankers face," commented Grant Spencer, Reserve Bank Assistant Governor and member of the judging panel.

"Rather than just expecting students to learn established facts, this competition confronts them with the challenges, ambiguity and uncertainty of actual decision making. All of the teams competing today displayed a good knowledge of how monetary policy works."

All final participants received a \$50 book voucher and certificate and Nelson College, Burnside High School and Tauranga Girls' High School received cheques for \$2,500, \$1,500 and \$750 respectively.

RBNZ MPS and OCR dates for 2006

24 August 2005

The following is the Reserve Bank's schedule for the release of its quarterly *Monetary Policy Statements* and Official Cash Rate announcements for 2006. Each *Monetary Policy Statement* includes within it an OCR announcement, so, as usual, in total there will be eight OCR announcements during 2006. Each announcement will be made at 9.00 am on the day concerned.

26 January	OCR announcement
9 March	Monetary Policy Statement
27 April	OCR announcement
8 June	Monetary Policy Statement

PUBLICATIONS

Annual Report
Financial Stability Report

Monetary Policy Statement

Reserve Bank of New Zealand Statement of Intent, 2004–2007

Snakes and Ladders – a guide to risk for savers and investors

Published in October of each year.

Published six-monthly. A statement from the Bank on the stability of the financial system. First copy free.

Published quarterly. A statement from the Bank on the conduct of monetary policy. First copy free, subsequent copies \$12.00.

Recent Reserve Bank Discussion Papers

2004

- DP2004/01 Estimating a time varying neutral real interest rate for New Zealand
Oliver Basevant, Nils Björkstén and Özer Karagedikli
- DP2004/02 Do inflation targeting central banks behave asymmetrically? Evidence from
Australia and New Zealand
Özer Karagedikli and Kirdan Lees
- DP2004/03 The equilibrium exchange rate according to PPP and UIP
Dominick Stephens
- DP2004/04 Estimates of the output gap in real time: How well have we been doing?
Michael Graff
- DP2004/05 What can the Taylor rule tell us about a currency union between New Zealand
and Australia?
Nils Björkstén, Arthur Grimes, Özer Karagedikli and Christopher Plantier
- DP2004/06 Improving implementation of inflation targeting in New Zealand: An
investigation of the Reserve Bank's inflation errors
Philip Liu
- DP2004/07 A model of equilibrium exchange rates for the New Zealand and Australian
dollar
Simon Wren-Lewis
- DP2004/08 Examining finite-sample problems in the application of cointegration tests for
long-run bilateral exchange rates
Angela Huang

2005

- DP2005/01 Factor model forecasts for New Zealand
Troy Matheson

Full lists of Discussion Papers are available from Administration, Economics Department. Lists of the Working Papers and the Research Notes can also be obtained from the Economics Department.

Pamphlets

Central banking in New Zealand
This is the Reserve Bank
Monetary policy over the business cycle
Your Bank's disclosure statement – What's in it for you?

For further information, go to www.rbnz.govt.nz, or contact:

Knowledge Centre,
Knowledge Services Group,
Reserve Bank of New Zealand,
2 The Terrace, P O Box 2498
WELLINGTON
phone (04) 4722–029

Articles and speeches in recent issues of the Reserve Bank of New Zealand *Bulletin*

Vol. 67, No. 3, September 2004

Articles

The long-run effects of monetary policy on output growth
NZIER's Capacity Utilisation index
Promoting strong corporate governance in New Zealand banks

Speeches

Supervising overseas-owned banks: New Zealand's experience
What's happening in the property sector?

Vol. 67, No. 4, December 2004

Articles

Liquidity management in the New Zealand banking sector
Currency hedging by exporters and importers
GDP-12 – the Bank's measure of trading partner demand
A note on the Reserve Bank inflation calculator

Speeches

Systemic financial crises – resolving large bank insolvencies
A prosperous but vulnerable nation

Vol. 68, No. 1, March 2005

Articles

Foreign reserves for crisis management
The Reserve Bank's new foreign exchange intervention policy
An overview of the manufacturing sector
Amendments to bank disclosure requirements
New Zealand economic and financial chronology 2004

Speech

New Zealand's potential growth rate

Vol. 68, No. 2, June 2005

Articles

The modernisation of New Zealand's currency and cash distribution
Savings and the household balance sheet
Developments in the New Zealand corporate sector
Overview of the New Zealand retail sector

Speech

Bank regulation and supervision in New Zealand: recent and ongoing developments